

TM 9-1985-5/TO 39B-1A-12

**JAPANESE
EXPLOSIVE
ORDNANCE**
(ARMY AMMUNITION
NAVY AMMUNITION)



*United States Government Printing Office
Washington : 1953*

Chapters 1, 2, and 3 are published in TM 9-1085-4/TO 39B-1A-11.

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

WASHINGTON 25, D. C., 16 March 1953

TM 9-1985-5/TO 39B-1A-12, is published for the information and guidance of all concerned.
[AG 471 (20 Feb 53)]

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NG: None.

Army Reserve: None.

For explanation of distribution formula, see SR 310-90-1.

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JAPANESE AMMUNITION—EXPLANATORY NOTES

Japanese Weapons

1. The bore diameter of Japanese Army weapons measures an even number of millimeters (metric system). However, the guns are designated by their nominal sizes, usually to the nearest even centimeter.

2. The bore diameter of Japanese Navy weapons quite often measures to an even inch in keeping with the English system, though some common Navy guns are designed with a bore diameter in an even number of millimeters. The Navy also designates its guns by nominal sizes, usually to the nearest even centimeter.

3. To avoid confusion, ammunition is classified in this book by the nominal bore size of the weapon according to the Japanese nomenclature with the actual size given in parenthesis. In Navy ammunition above 5-cm. the actual size is given in both metric and English measurement.

4. Both services designate the size of guns under 5-cm by the actual size in millimeters, e. g. 47-mm, 40-mm, 30-mm, 20-mm.

Classification of Projectiles

1. Army Projectiles

The Japanese nomenclature for projectiles is followed as far as practicable. The Japanese Army terminology is self-explanatory and conforms fairly well with U. S. custom.

Needing some explanation are the terms A. P. and A. P.-H. E.

A. P. indicates a projectile intended for piercing heavy armor, for example, armor plate of thickness equal to or greater than the caliber of the projectile. These projectiles have an H. E. bursting charge.

A. P.-H. E. indicates a solid-nosed projectile in general similar to the A. P. but designed for much lighter penetration. These carry an H. E. charge approaching that of a standard H. E. projectile. Hence, the term A. P.-H. E. is intended to indicate its intermediate status between an H. E. projectile and a heavy armor-piercing projectile. A. P.-H. E. projectiles are painted like H. E. projectiles but obviously they may be differentiated by their form.

2. Navy Projectiles

The classification and designation of Navy projectiles by the Japanese is highly irregular and cumbersome. Complete and accurate identification of a projectile requires identification of the gun, descriptive nomenclature of the projectile,

and mark (or type) and modification number.

Example: 14 cm/50 Ordinary
(Gun) (General type of
 projectile)

Type 0
(Design number)

For this reason an arbitrary system of nomenclature is used in this book. Japanese Navy nomenclature is given as a sub-title where known.

In Japanese Navy nomenclature all projectiles with a relatively high explosive charge (including light armor-piercing types) are designated TSUJODAN, which may be translated either "Ordinary Projectile" or "Common Projectile." Since this is a composite group including standard high explosive projectiles as well as light penetrating types, the translation "Ordinary" is used in this book for Japanese designations and the term "Common" is reserved for specific use as a descriptive title for light penetrating types of projectile (solid nose, base-fuzed) in accordance with the U. S. meaning of "Common." Projectiles having a point detonating fuze are designated "High Explosive" to conform with U. S. terminology.

Abbreviations

The following abbreviations will be used in this section:

A. A. M. G.	Antiaircraft Machine Gun.
A. C.	Aircraft Cannon.
A. C. M. G.	Aircraft Machine Gun.
A. P.	Armor-Piercing.
A. P. I.	Armor-Piercing Incendiary.
A. P. T.	Armor-Piercing Tracer.
A. T. K.	Anti-tank.
H. E.	High-Explosive.
H. E. A. T.	High-Explosive Anti-tank (Hollow Charge).
H. E. I.	High-Explosive Incendiary.
H. E. I. T.	High-Explosive Incendiary Tracer.
H. E. T.	High-Explosive Tracer.
H. M. G.	Heavy Machine Gun.
I.	Incendiary.
I. T.	Incendiary Tracer.
L. M. G.	Light Machine Gun.
M. K.	Mark.
M. O. D.	Modification.
S. D.	Self-Destroying.
T. K.	Tank.
W. P.	White Phosphorus.

Chapter 4

ARMY AMMUNITION

INTRODUCTION

Japanese Army weapons are generally copies of German or French designs or are developed following their customs. In comparison with weapons used by other countries in the past few years, the Japanese weapons appear to be outmoded and ineffective.

This is particularly true in considering small arms for if the Japanese ever made any serious attempt to standardize small arms and small arm ammunition there is little evidence of it in the many different calibers and types in use by them. The standard weapon prior to 1930 was 6.5 mm, but shortly thereafter this was superseded by 7.7 mm weapons. However, this change was never complete and 6.5 mm weapons were used extensively in the last war. The foreign influence is apparent particularly after 1939 when aircraft machine guns of German and Italian design were copied.

The earlier aircraft machine guns and aircraft cannon were either modifications of Japanese ground mounts or copies of foreign guns. In more recent years, however, the Japanese designed aircraft cannon as large as 120 mm, but nothing larger than 57 mm was ever put in service use.

Most Japanese artillery weapons were characterized by their immobility as very few of them were designed for rapid motor transport. Although 105 mm and 150 mm weapons were frequently encountered, the standard field piece was 75 mm.

One outstanding characteristic of Japanese Army ammunition is the large variety of types and sizes of mortars which were in use. Mortars were used not only as infantry support weapons but also as artillery pieces. They ranged in size from the 50-mm Grenade Discharger to the 320-mm Spigot Mortar.

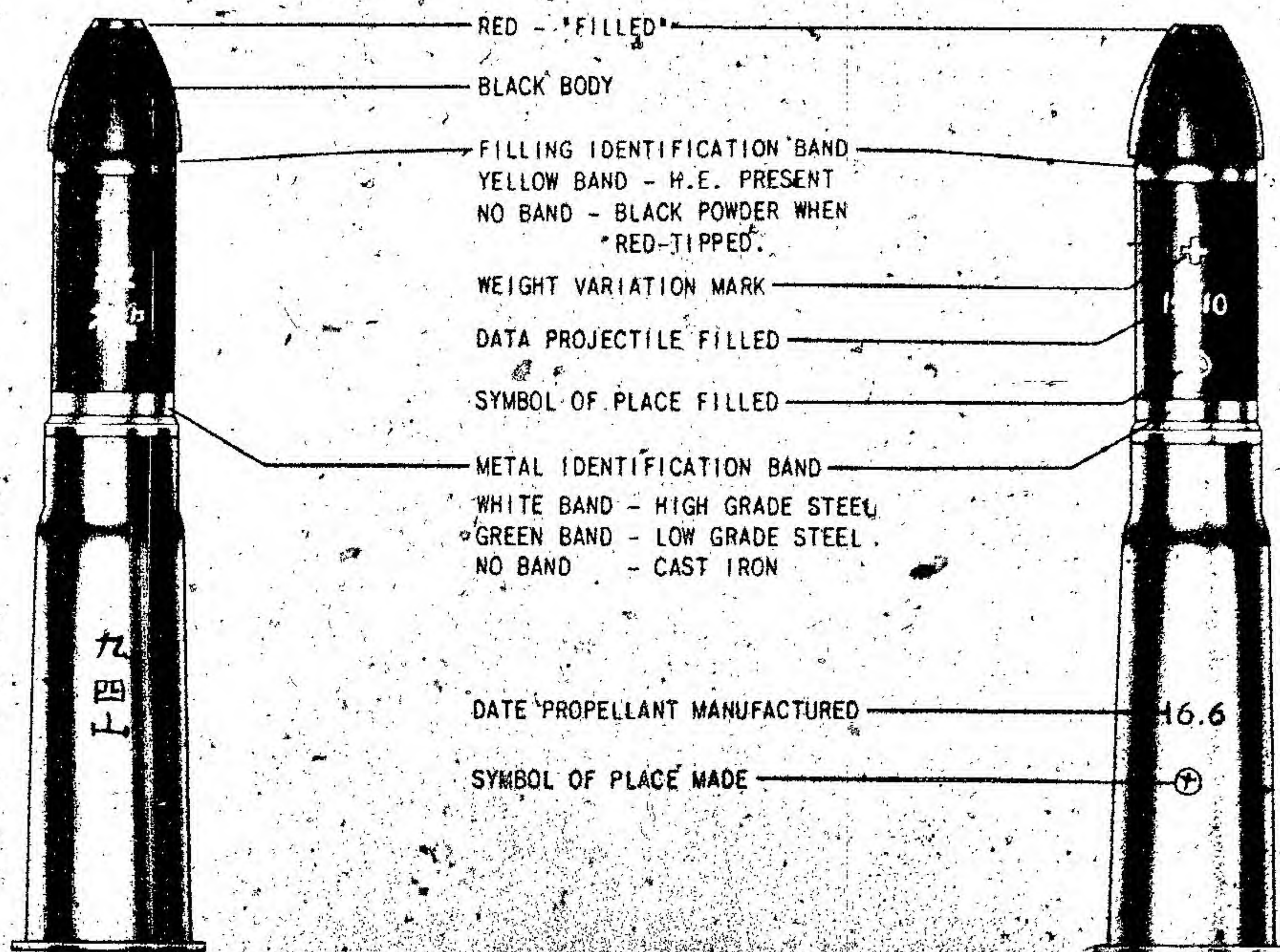
The standard Antiaircraft Gun was a 75-mm gun but there was also an 88-mm Antiaircraft Gun which was one of their most effective artillery pieces and a 105-mm A. A. gun. The Japanese has designed a 150-mm Antiaircraft Gun for the defense of the home islands but this was used only in the last few months of the war.

The newest trend in research and development in ammunition was along the line of rockets. Very few types of Japanese rockets were used during the war but there were many experimental models of antitank and artillery rockets in development, ranging in size from 75 mm to 60 cm.

Research was also being conducted on smooth-bore and recoilless weapons but this was a relatively new program and none of these weapons was ever developed beyond the experimental stage.

JAPANESE EXPLOSIVE ORDNANCE

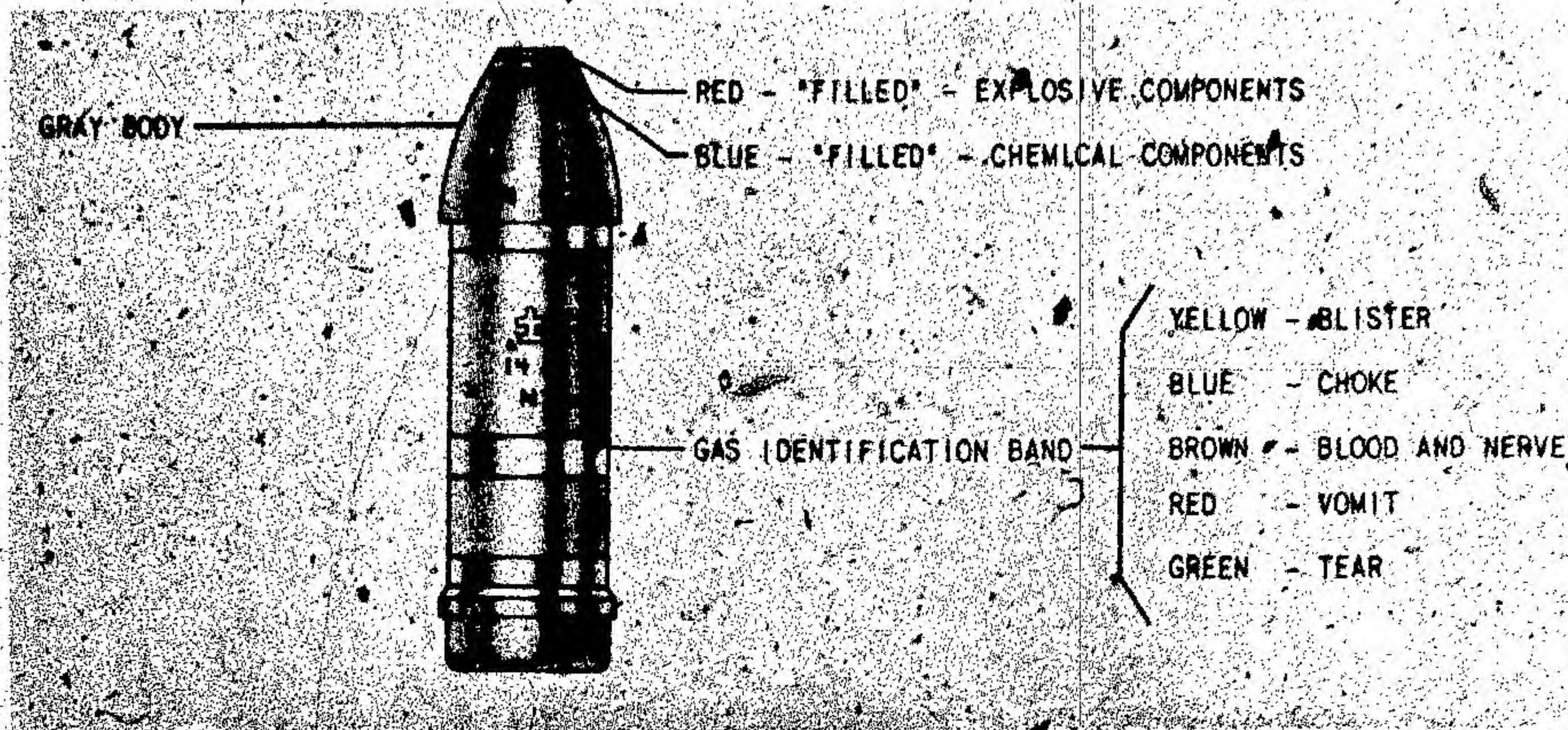
ARMY—OLD COLOR SYSTEM



Common Explosive Types

Japanese characters giving the type number of the projectile (painted on projectile) and type number of the gun (painted on the case) appear only when there is chance of confusion with similar projectiles or cases.

Chemical (Gas or Liquid Filled) Projectiles



Special-Purpose Projectiles

Projectiles designed for special purposes are painted black over all and are identified by a special symbol stenciled near the middle of the body. For a list of these projectiles and symbols, refer to the new color system.

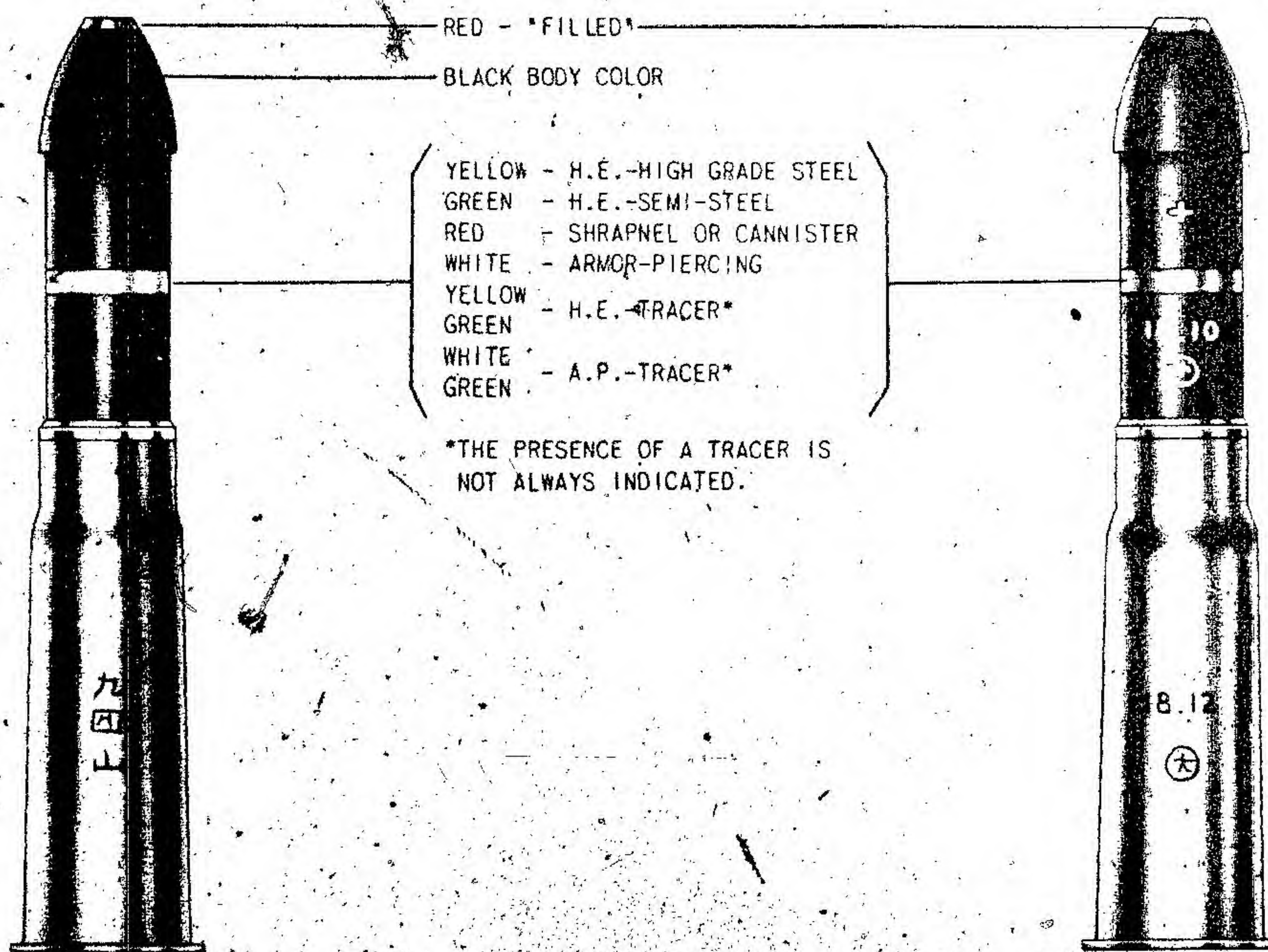
Weight Variation Marking

The variation of individual projectiles from standard weight is important in the ballistics problem and can be corrected for in setting sights. The variation is therefore indicated by plus or minus signs painted on the projectile.

Overweight	1.5 to 2.5 percent overweight.	++
	0.5 to 1.5 percent overweight.	+
Standard weight	0.5 percent plus or minus.	±
	0.5 to 1.5 percent underweight.	-
Underweight	1.5 to 2.5 percent underweight.	--

ARMY—NEW COLOR SYSTEM

The new system is based on the old system, but is designed as a simplification in which fewer color bands are used. Body color of projectiles distinguishes broad groups. Color bands designate more specific features. The use of accessory markings such as type numbers, weight marks, dates, and arsenal symbols is the same in both systems.

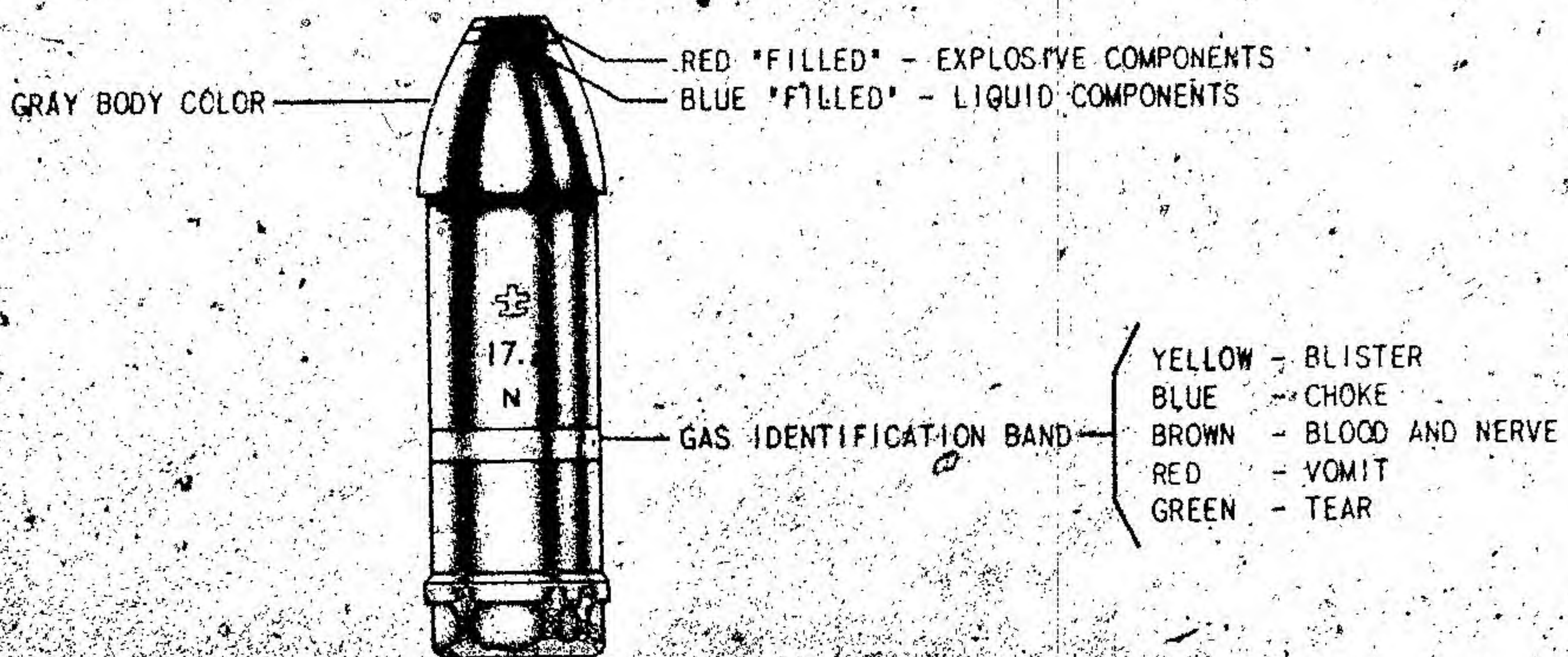


Common Explosive Types

Hollow charge ammunition is distinguished from other types in the H. E. high grade steel (yellow band) group by the presence of the symbol

INTRODUCTION TO ARMY AMMUNITION

Chemical (Gas or Liquid Filled) Projectiles



Special-Purpose Projectiles

Projectiles designed for special purposes as listed below are identified by the over-all body color and by a special symbol stenciled near the middle of the body.

Projectile	Color of body	Symbol
Smoke (signal or screening).	White	ク
Incendiary (nonliquid)	Yellow	ヤ
Illuminating	Red	ア
Target	Black	モ
Sand-filled	Black	ス

JAPANESE EXPLOSIVE ORDNANCE

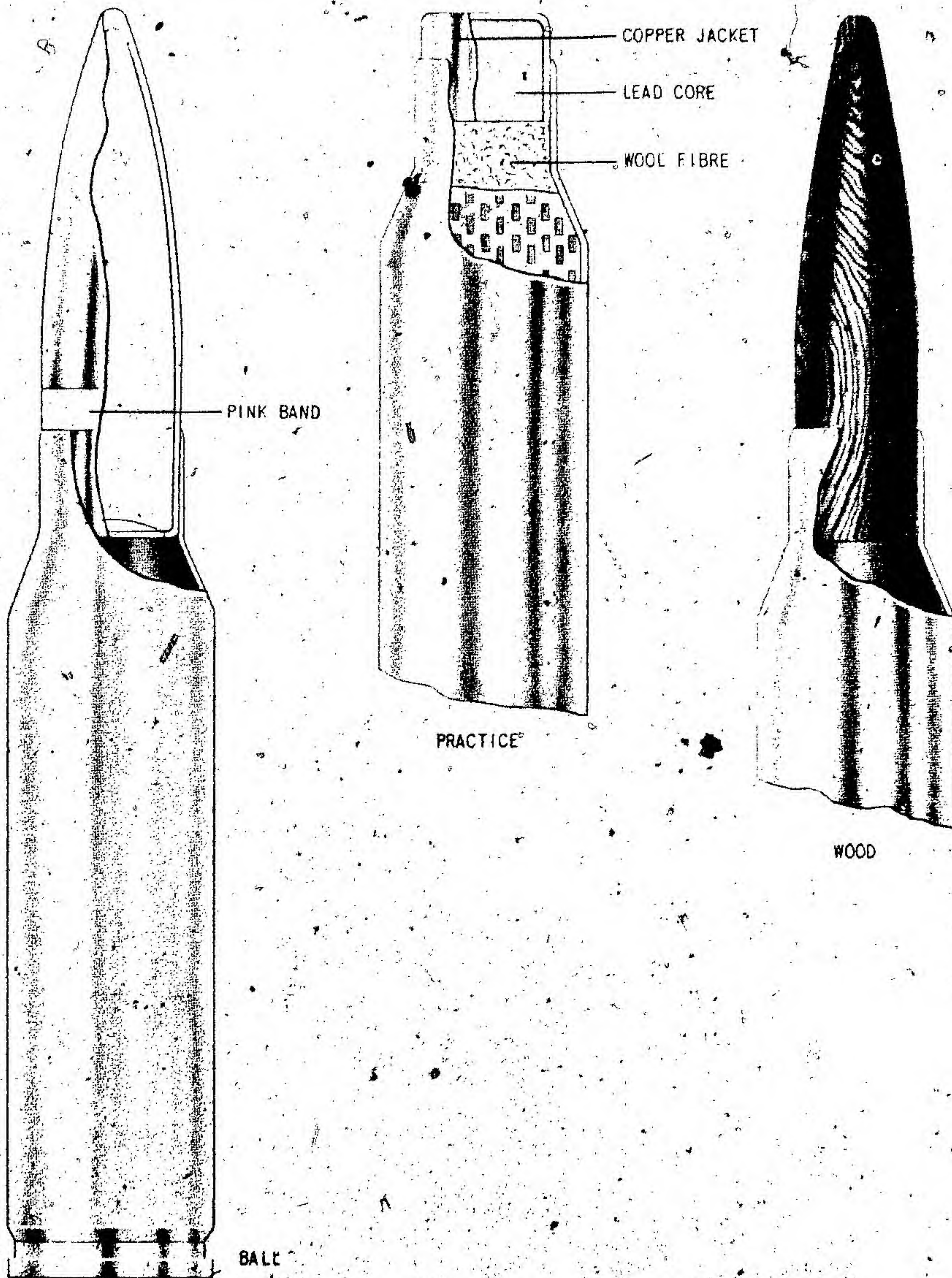


Figure 201—Type 38 8.5-mm Ammunition.

Chapter 4—Section 1

ARMY PROJECTILES

Type 38 6.5-mm Ammunition

	Ball	Training	Wooden
Over-all length	3 inches	2½ inches	2½ inches.
Length of case	2 inches	2 inches	2 inches.
Length of projectile	1¼ inches	¾ inch	1¼ inches.
Weight of projectile	138 grams	34 grams	5 grams.

Construction:

Type	Projectile Jacket	Projectile Core
Ball	CuNi or steel	Lead
Tracer	CuNi	Lead
Blank	Projectile of wood.	
Blank	Projectile of paper.	
Practice ball (snub nosed)	Copper	Lead

Weapons in which used:

Rifle	L. M. G.	A. A. M. G.
Type 38 rifle	Type 11 yr. L. M. G.	Type 3 yr. A. A. M. G.
Type 38 snipers rifle	Type 91 Vehicle L. M. G.	Type 38 A. A. M. G.
Type E rifle	Type 96 L. M. G.	
Type 38 carbine.		
Type 44 carbine.		

Color and markings:

Type	Bands
Ball	Pink.
Tracer	Green.
Blank	Wood.
Blank	Paper (purple).
Practice ball	Pink.

Remarks: Ammunition when used in rifles and light machine guns will be found in clips of 5 rounds each. When used in the heavy machine guns it will be found in feeder strips of 30 rounds each. The wooden bullet round is used with the

rifle to launch the rifle smoke grenade. The paper bullet round is used to launch rifle grenades. The propelling powder used in the blank rounds is nitro-cellulose while in the other rounds it is graphite-coated nitro-cellulose.

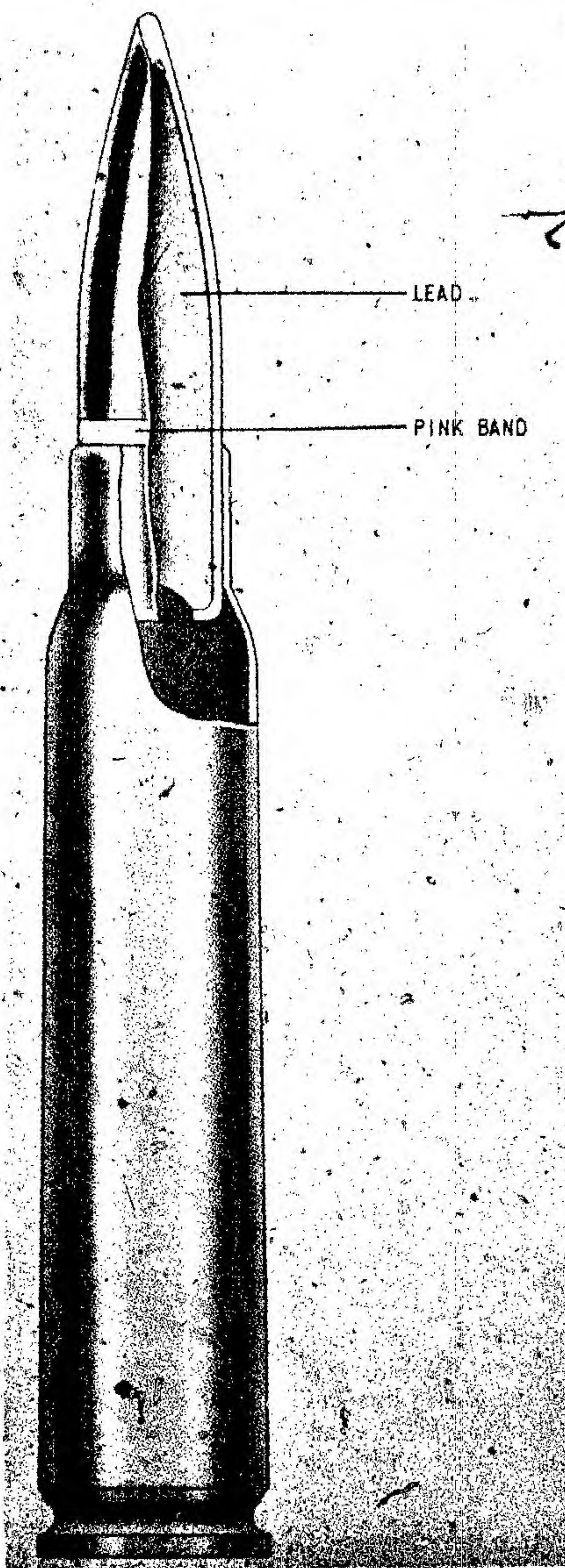


Figure 202—Type 99 (Rimless) 7.7-mm Ammunition.

Type 99 (Rimless) 7.7-mm Ammunition

	Ball	A. P. (Inch)	Tracer (Inch)	Wooden
Over-all length	3 $\frac{1}{4}$ inches	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$ inches
Length of case	2 $\frac{1}{4}$ inches	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$ inches
Length of projectile	2 $\frac{1}{4}$ inches	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$ inches
Weight of projectile	181 grams			5 grams

Construction:

Type	Projectile Jacket	Projectile core
Ball	CuNi	Lead.
Tracer	CuNi	Lead.
A. P.	CuNi	Hard steel.
Blank	Projectile of wood.	
Blank	Projectile of paper.	

Weapons in which used:

Rifle	L. M. G.	H. M. G.
Type 99 rifle	Type 99 L. M. G.	Type 92 H. M. G.
Type 99 modified rifle	Type 97 TK. M. G.	Type 1 H. M. G.
Type 2 rifle.		

Color and markings:

Type	Bands
Ball	Pink.
Tracer	Green.
A. P.	Black.
Blank	Wood.
Blank	Paper (purple).

Remarks: The heavy machine guns use feed strips of 30 rounds. When used in light machine guns and the rifle, this ammunition is packed in 5-round clips.

In addition to the usual brass cartridge cases, ammunition with a steel case has been found.

JAPANESE EXPLOSIVE ORDNANCE

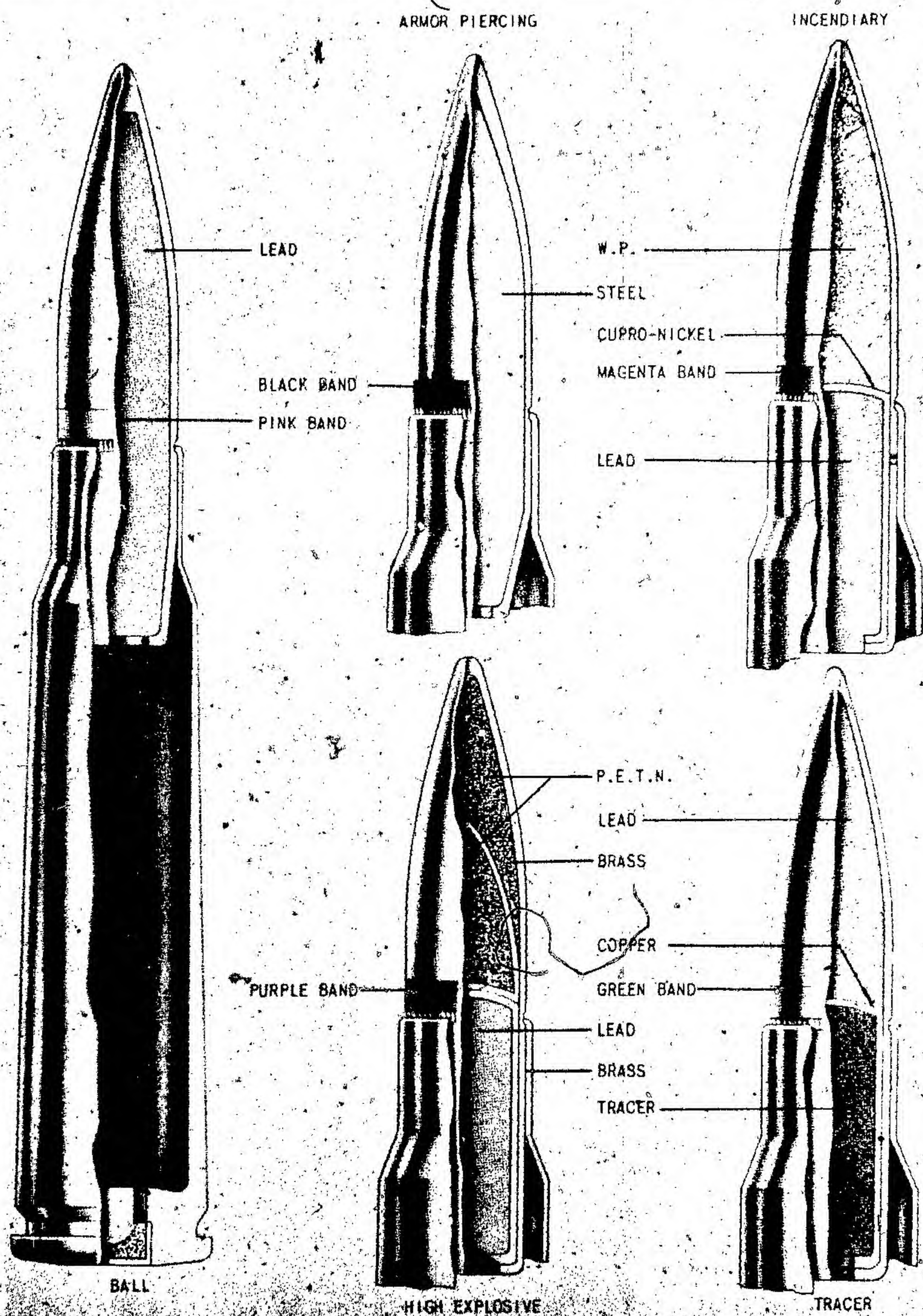


Figure 203—Type 92 (Semirimmed) 7.7-mm Ammunition.

Type 92 (Semi-rimmed) 7.7-mm Ammunition

		Ball	A. P.	Tracer	Incendiary	H. E.
Over-all length	inch	3 $\frac{3}{4}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$
Length of case	inch	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$
Length of projectile	inch	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Weight of projectile	grams	203	162	155	162	162

Construction:

Type	Projectile jacket	Projectile core
Ball	CuNi	Lead.
Tracer	CuNi	Lead.
A. P.	CuNi	Hard steel.
Incendiary	CuNi	W. P. and lead.
H. E.	CuNi	P. E. T. N. and lead.

Weapons in which used:

- Type 89 Flexible A. C. M. G.
- Type 89 Flexible A. C. M. G. (special).
- Type 89 Fixed A. C. M. G.
- Type 92 H. M. G.

Color and markings:

Type	Bands
Ball	Pink.
Tracer	Green.
A. P.	Black.
Incendiary	Magenta.
H. E.	Purple.

Remarks: The type 92 heavy machine gun uses feed strips of 30 rounds. When used for aircraft flexible machine guns, this ammunition is packed in 5-round clips in a manner corresponding to the packing of rimless, rifle ammunition, but the

clip is of larger size to accommodate the larger bore of the semirimmed type.

The P. E. T. N. in the H. E. round is set off by the heat of impact.

JAPANESE EXPLOSIVE ORDNANCE

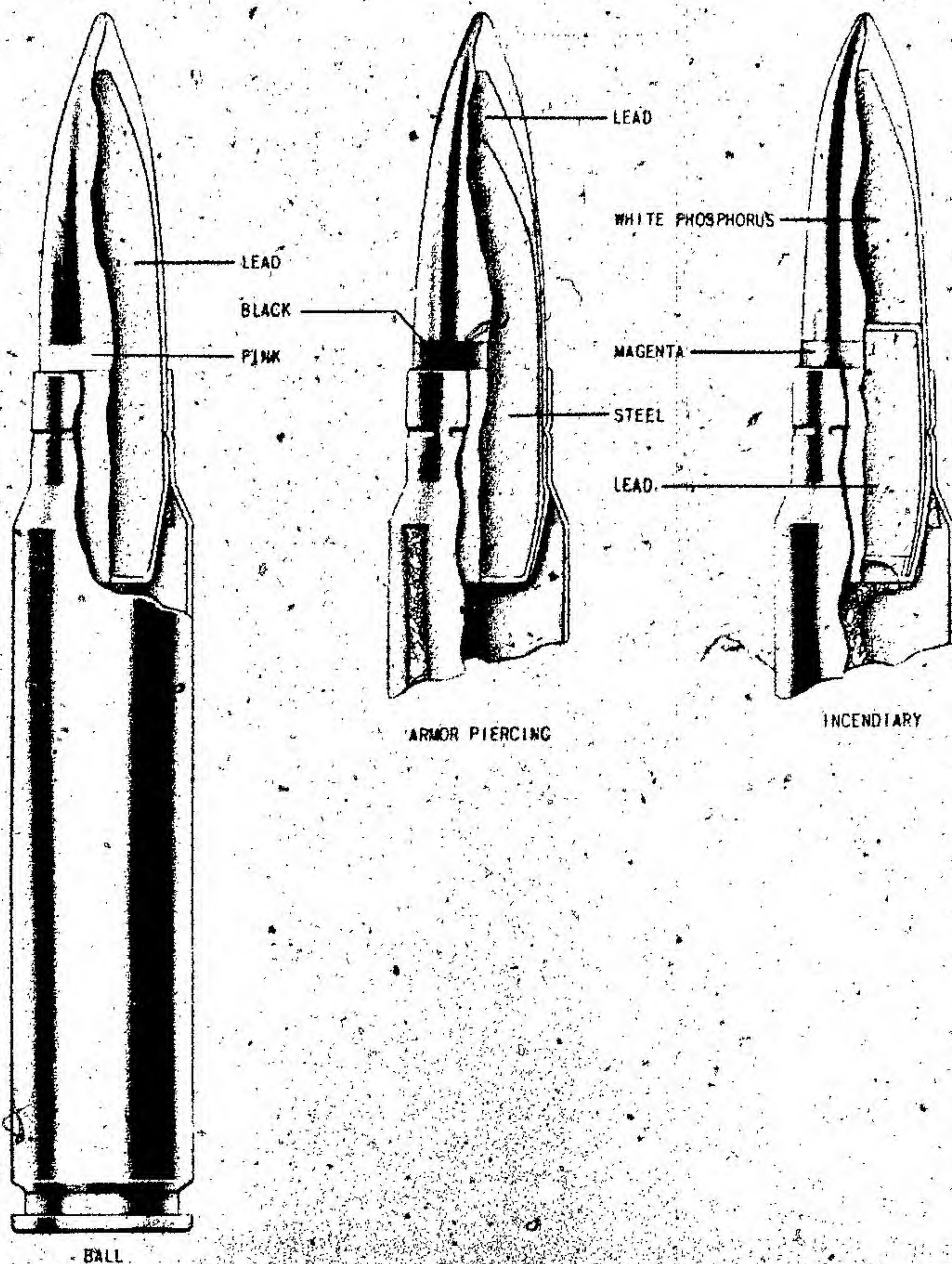


Figure 204—7.92-mm Aircraft Machine Gun Ammunition.

7.92-mm Aircraft Machine Gun Ammunition

Construction:

	Ball	A. P.	Incendiary	H. E.
Over-all length (inch)	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{4}$
Length of case do	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$
Length of projectile do	1 $\frac{1}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{8}$	
Weight of projectile (grams)	180	182	182	

Type	Projectile jacket	Projectile core
Ball	Gilding metal	Lead
A. P.	CuNi	Hard steel
Incendiary	CuNi	W. P. and lead
H. E.	CuNi	P. E. T. N. and lead

Weapons in which used:

Bren type L. M. G.
Type 98 flexible A. C. M. G.
Type 100 flexible A. C. M. G.

Color and markings:

Type	Bands
A. P.	Black
Incendiary ...	Magenta
H. E.	White

Remarks: The Bren type L. M. G. uses a box-type magazine similar to the U. S. B. A. R. The type 98 and type 100 A. C. M. G. use a saddle type magazine.

8-mm Pistol Ammunition

Over-all length: $1\frac{1}{4}$ inches.
Length of case: $1\frac{1}{8}$ inch.
Length of projectile: $1\frac{1}{2}$ inch.
Weight of projectile: 102 grams.

Construction:

Type: Ball.
Projectile jacket: CuNi.
Projectile core: Lead.

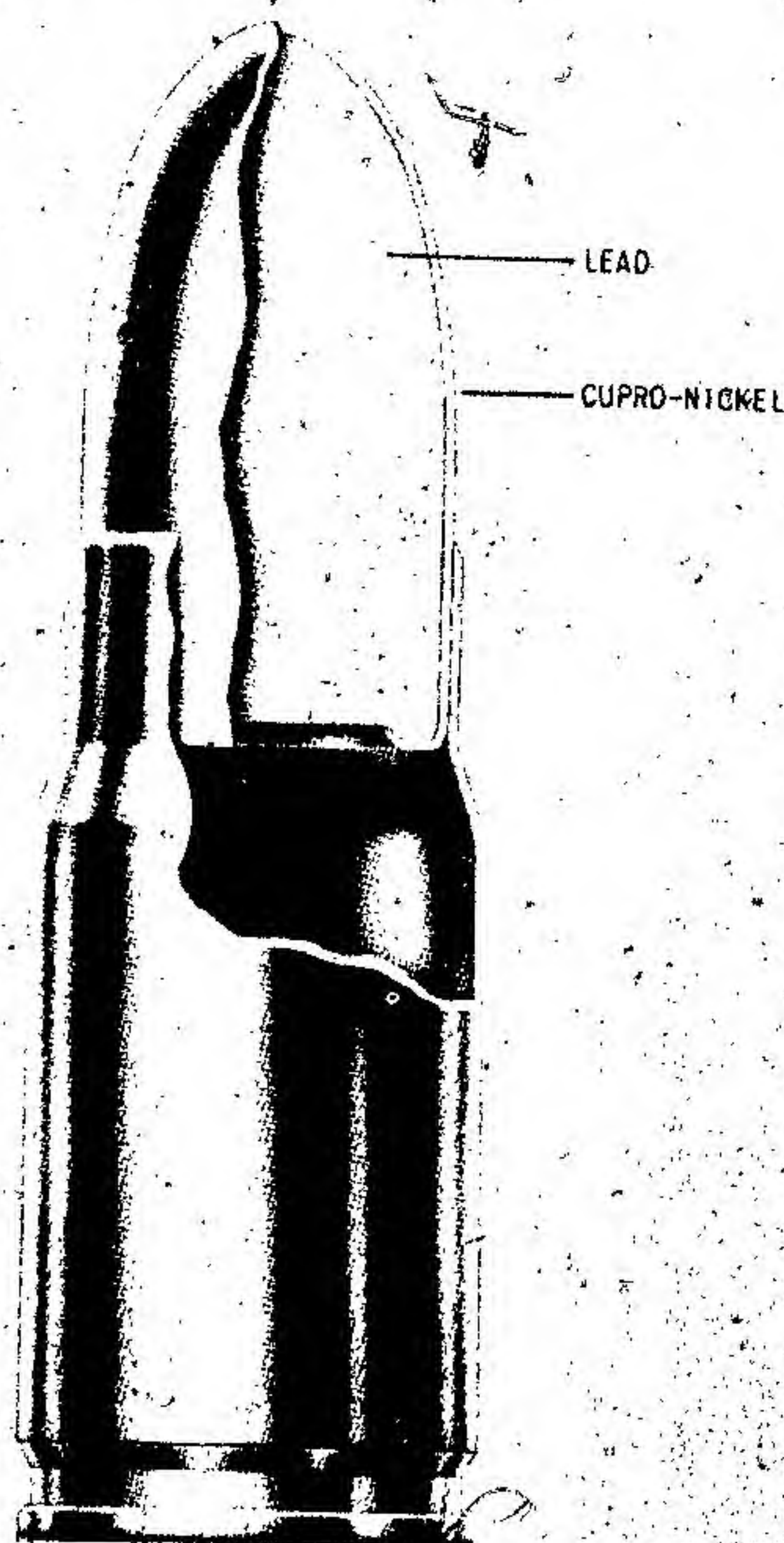


Figure 205—8-mm Pistol Ammunition.

Weapons in which used:

Nambu pistol.
Type 14 pistol.
Type 94 pistol.
"Solothurn" submachine gun.
"Bren Type" submachine gun.
Type 100 submachine gun.

Remarks: The propelling case is rimless and made of brass. There is a tear-gas round, but specifications indicate that this is a relatively large missile and it is probably launched from the pistol somewhat in the manner of launching grenades from a rifle.

9-mm Pistol Ammunition

Over-all length: $1\frac{1}{4}$ inches.
Length of case: $2\frac{7}{32}$ inch.
Length of projectile: $\frac{3}{4}$ inch.
Weight of projectile: 150 grams.

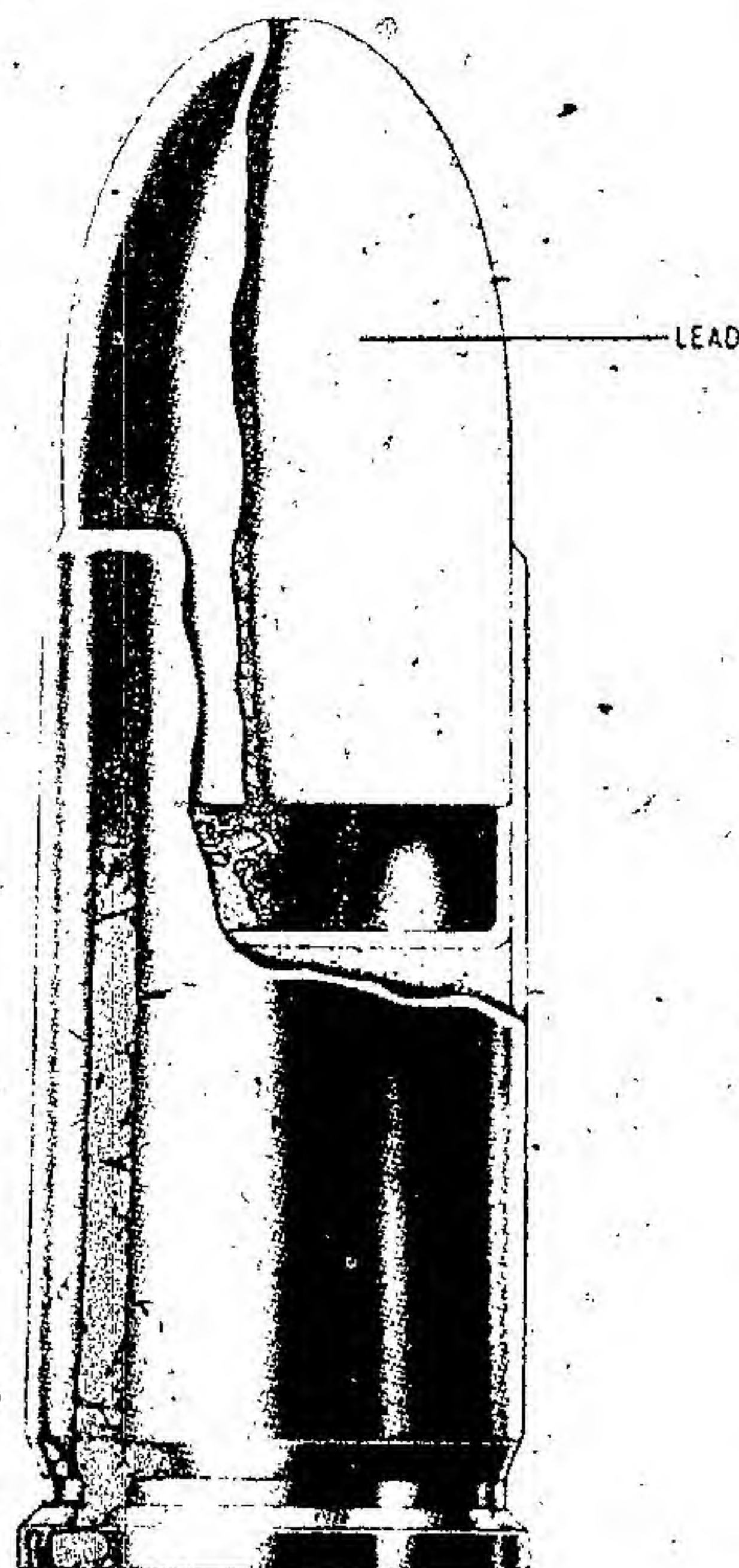


Figure 206—9-mm Pistol Ammunition.

JAPANESE EXPLOSIVE ORDNANCE

Construction:

Type: Ball.

Projectile jacket: CuNi.

Projectile core: Lead.

Weapons in which used:

Type 26 revolver (Webley type).

Smith and Wesson pistol.

Remarks: The propelling case is rimless and made of brass. There is a tear-gas round, similar to that mentioned for the 8-mm pistol.

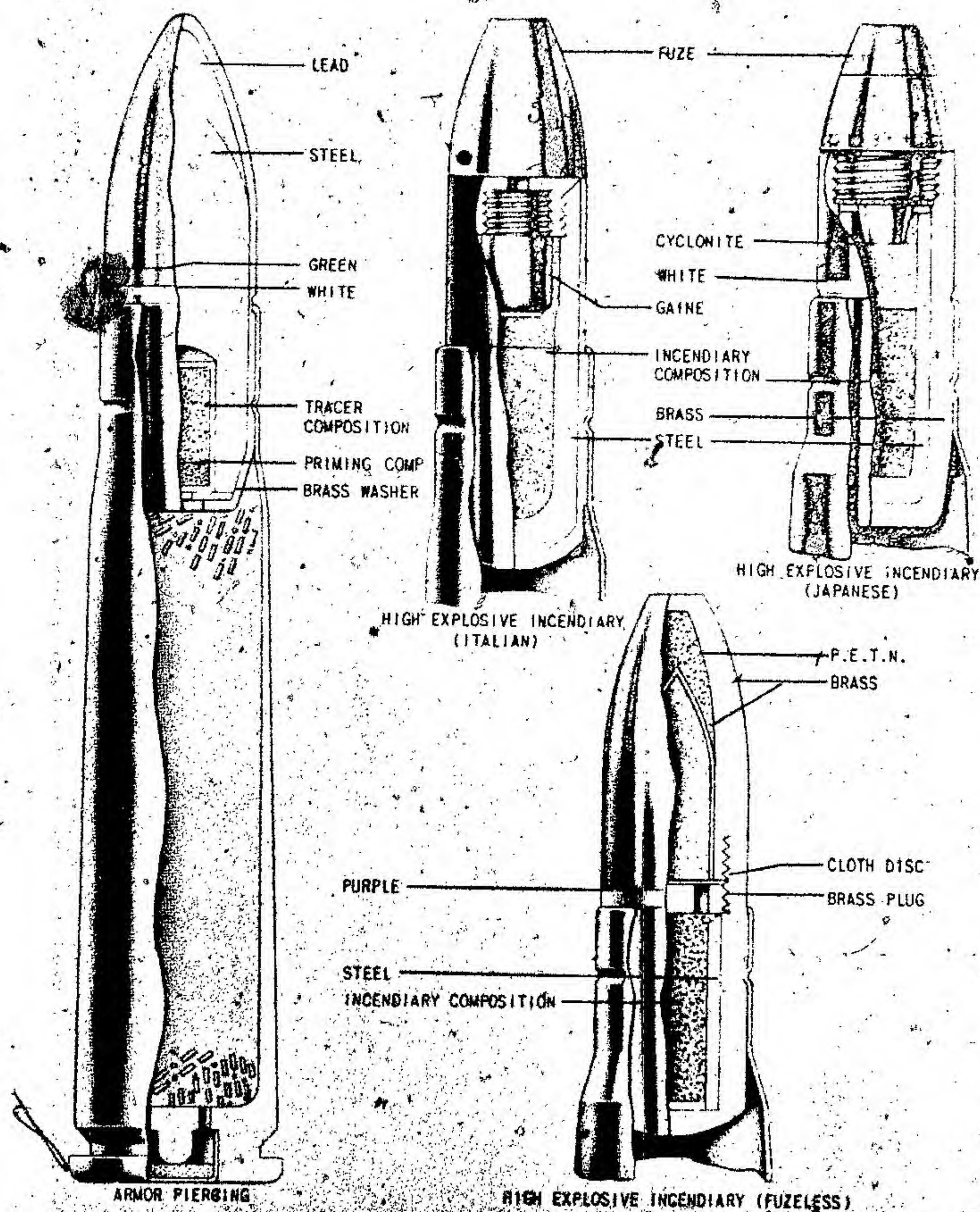


Figure 207—12.7-mm Aircraft Cannon Ammunition.

12.7-mm Aircraft Cannon Ammunition

		A. P. T.	A. P. (Italian)	H. E. I. (Italian)	H. E. I.	H. E. I. (fuzeless)
Over-all length	(inches)	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$
Length of case	(inches)	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$
Length of projectile	(inches)	1 $\frac{1}{4}$	2 $\frac{1}{4}$	2	1 $\frac{7}{8}$	2
Weight of projectile	(ounces)	1.25	1.35	1.35	1.21	1.16

Construction:

Type	Projectile jacket	Projectile core
Ball	CuNi	Lead.
A. P. T.	Brass	Steel.
H. E. I. (fuzed Japanese)	Brass	P. E. T. N. incendiary and steel.
H. E. I. (fuzed Italian)	Brass	P. E. T. N. incendiary and steel.
H. E. I. (fuzeless)	Brass	P. E. T. N. incendiary and steel.
Tracer	CuNi	Steel.
A. P. (Italian)	Gilding metal	Lead tip, steel core.

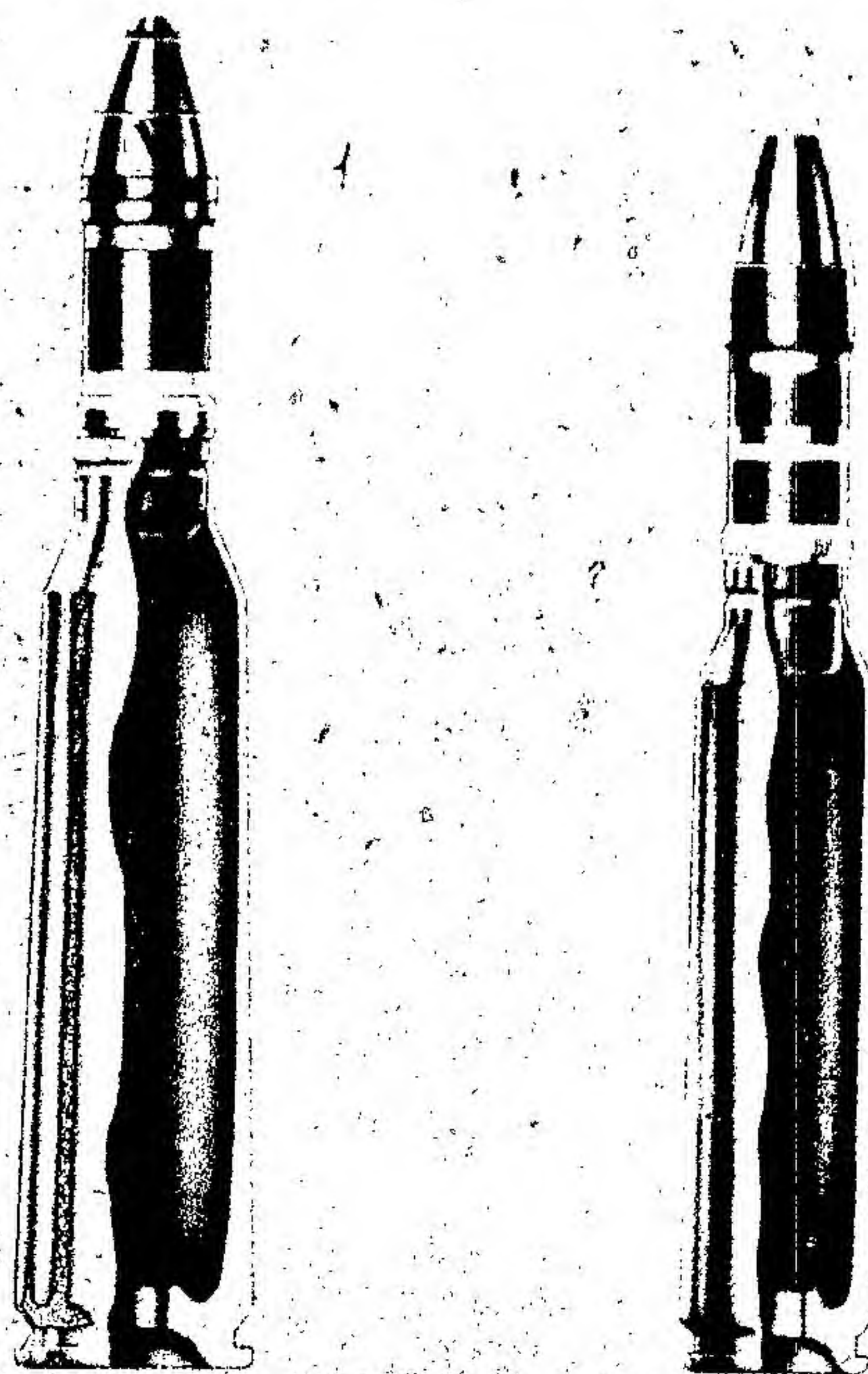
Weapons in which used: HO 103 A. C. M. G.

Color and markings:

Type	Color Bands
Ball	Red.
A. P. T.	Black or green and white.
H. E. I. fuzed	White.
H. E. I. fuzeless	Purple.
H. E. I. fuzed (Italian)	Red, blue, or green body.
Tracer	Green.
A. P. (Italian)	Black tip on nose.

Fuzing: Italian 12.7 mm. fuze or Japanese 12.7-mm fuze.

Remarks: This ammunition was copied by the Japanese from the Italians. Of the two H. E. I. fuzed rounds, one is Italian and the other is a Japanese copy of it. The Japanese H. E. I. fuzed differs from the Italian round in that the fuze used is of two-piece construction instead of one. This ammunition is packed in 10-round cartons and is reloaded into metal link belts for use.



TYPE 98 ANTI-AIRCRAFT
ANTI-TANK GUN

TYPE 97 ANTI-TANK GUN,
HO-1 AIRCRAFT GUN,
HO-3 AIRCRAFT GUN

Figure 208—Type 97 and Type 98 20-mm Ammunition.

Type 97 and Type 98 20-mm Ammunition

There are four Army 20-mm guns using similar projectiles and three of these guns use the same cartridge case. The guns using the small size cartridge case are the type 97 antitank gun, the Ho 1 (flexible) and Ho 3 (fixed) aircraft guns. The type 98 antiaircraft/antitank gun uses the large size cartridge case.

Case:	Small	Large
Length.....	4.89	5.58
Diameter of base.....	1.12	1.12
Weight (empty) (grams)...	129.9	208.3

Both cases are made of drawn brass and are of the rimless type. The case is crimped to the projectile by three long crimps and sealed by a clear lacquer.

Propellant: The propellant is graphited smokeless powder made in single perforated cylindrical grains approximately 1½ mm in diameter and 3 mm in length. The weight of the propellant in the small case is 35.8 grams and, in the large case, 58.9 grams.

20-mm High-Explosive Tracer Projectile

Over-all length: $8\frac{3}{4}$ inches.

Length of projectile: $3\frac{1}{4}$ inches.

Weight of projectile: 4.54 ounces.

Filling: Cyclonite, tracer composition.

Color and markings: Black body with yellow band just aft of bourrelet and white band forward of rotating band.

Fuzing: Type 93 small instantaneous fuze.

Weapons in which used: Type 98 antiaircraft/antitank gun.

Remarks: This projectile is made of steel with two cavities separated by a septum. The round is characterized by a sharp bourrelet.

Type 98 20-mm High-Explosive Tracer Projectile

Over-all length: $7\frac{2}{4}$ inches.

Length of projectile: $2\frac{1}{2}$ inches.

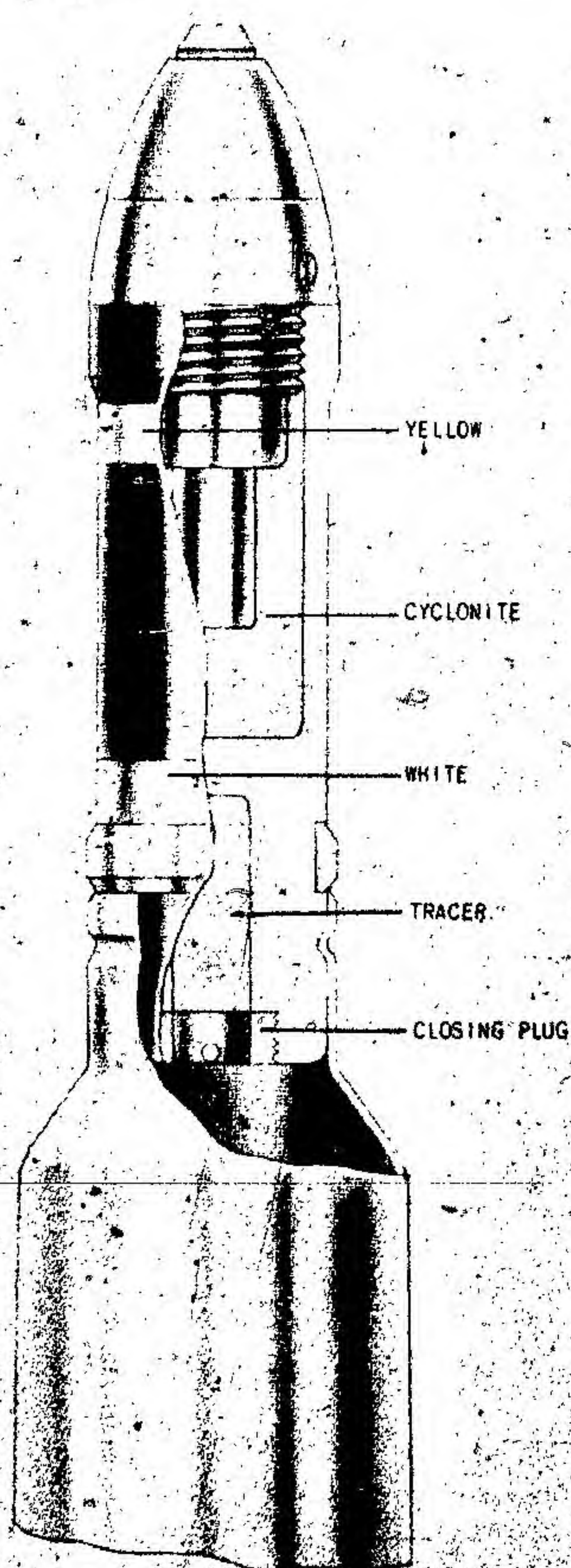


Figure 209—20-mm High-Explosive Tracer Projectile.

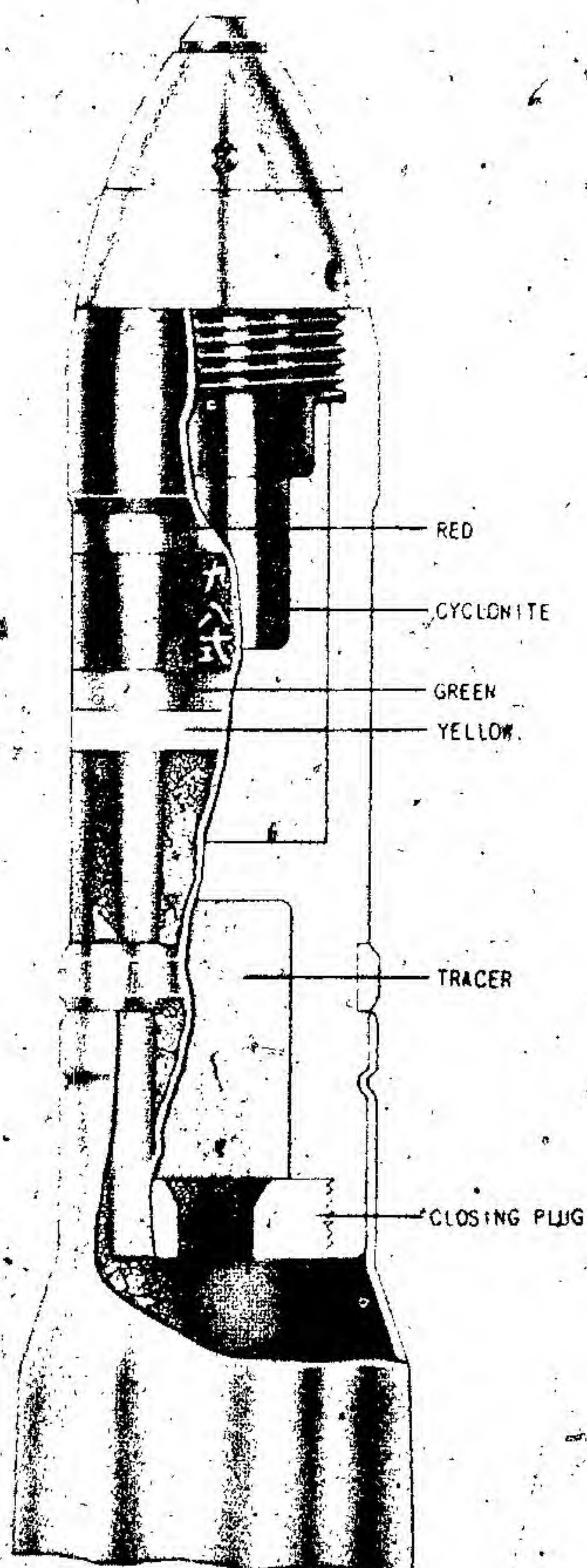


Figure 210—Type 98 20-mm High-Explosive Tracer Projectile.

JAPANESE EXPLOSIVE ORDNANCE

Filling: Cyclonite, tracer composition.

Fuzing: Type 93 small instantaneous fuze.

Color and markings: Black body with red band just aft of bourrelet, green, and yellow bands forward of rotating band. **九八式**

(Type 98) is stenciled on the body.

Weapons in which used: Type 97 antitank gun.

Remarks: This projectile is made of steel, with two cavities separated by a septum.

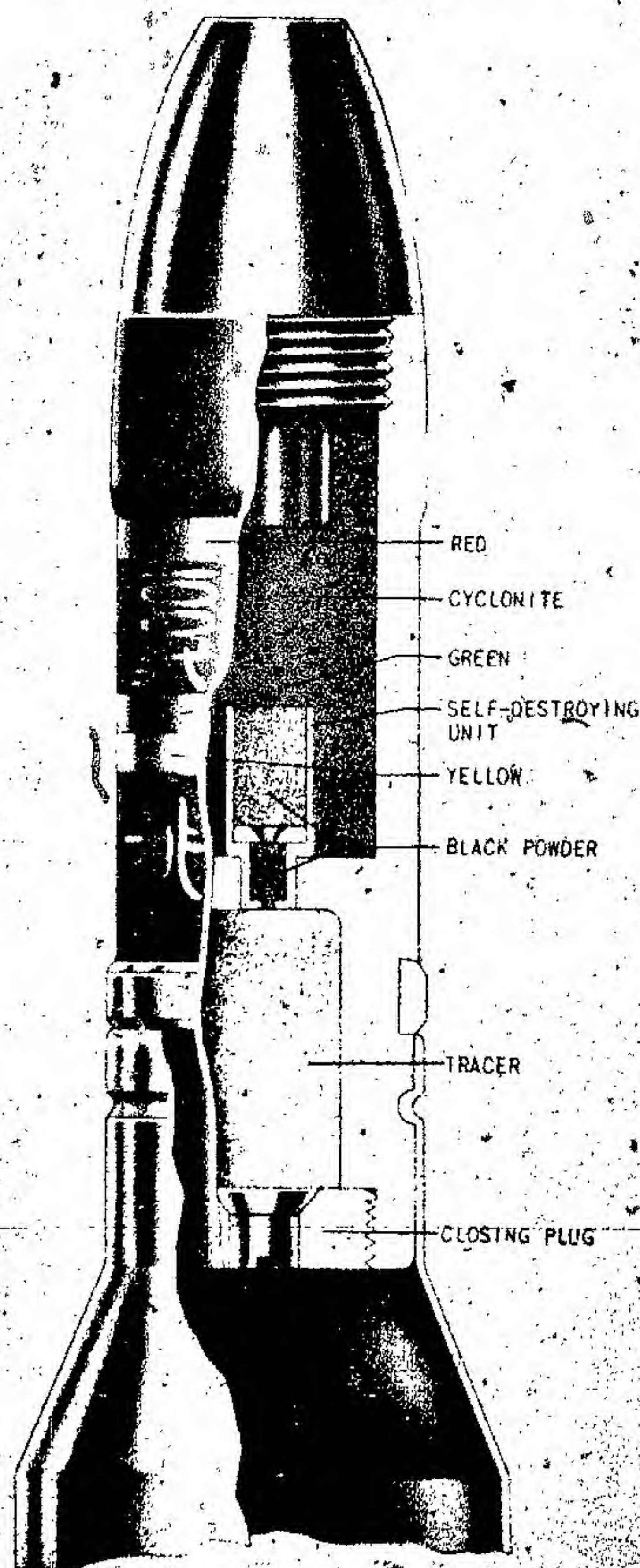


Figure 211—Type 100 20-mm High-Explosive Tracer (Self-Destroying) Projectile.

Type 100 20-mm H. E. T. (Self-Destroying) Projectile

	Type 97 A/TK	Type 98 AA/A/TK
Over-all length---	7 $\frac{1}{2}$ inches----	8 $\frac{1}{4}$ inches.
Length of projectile.	3 $\frac{1}{4}$ inches---	3 $\frac{1}{4}$ inches.
Weight of projectile.	4.7 grams--	4.7 grams.

Filling: Cyclonite, tracer composition.

Fuzing: Type 100 experimental projectile used type 93 small instantaneous fuze; other two projectiles use type 100 small instantaneous fuze.

Color and markings: Black body with red band just aft of bourrelet, green and yellow bands forward of rotating band. Type 100 has

一〇〇式 stenciled on body, type 100 experimental has **一〇〇式試**

stenciled on body, and type 100 Mod 1 has

一〇〇式修 stenciled on body.

Weapons in which used:

Type 97 antitank gun.

Type 98 antiaircraft/Antitank gun.

Remarks: The projectile is made of steel with two cavities separated by a septum. Leading through the septum and into the explosive cavity is a black powder lead-in. When the tracer has burned out it will ignite the lead-in which will detonate the explosive filling.

There is an earlier model of this projectile, designated type 100 Experimental which does not have a self-destroying feature.

There is also a type 100 Mod 1 which differs from this projectile in that it is filled with black powder instead of cyclonite.

20-mm High Explosive Incendiary Projectile

Over-All length: 7 $\frac{1}{2}$ inches.

Length of case: 4 $\frac{1}{2}$ inches.

Length of projectile: 3 $\frac{1}{4}$ inches.

Weight of projectile: 4.48 ounces.

Filling: Cyclonite, incendiary composition.

Fuzing: Type 93 small instantaneous fuze.

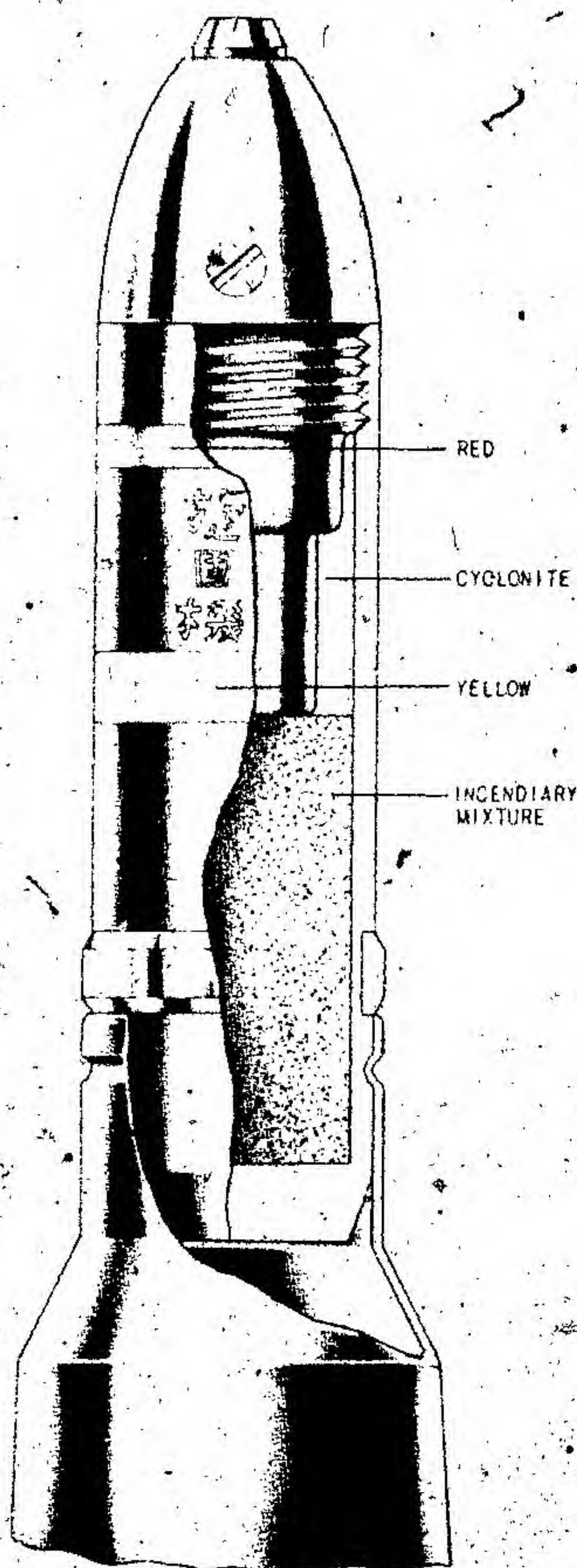


Figure 212—20-mm High-Explosive Incendiary Projectile.

Color and markings: Black body with red band just abaft bourrelet, yellow band forward of rotating band. The characters

旋 固 機

(fixed or flexible machine cannon)
are stenciled down the body.

Weapons in which used: Ho-1 (flexible) and Ho-3 (fixed) aircraft-cannon.

Remarks: The projectile is made of steel. It contains two pellets, the forward one, surrounding the fuze gain, is cyclonite while the after pellet is an incendiary mixture.

20-mm High-Explosive Incendiary (Ma 201) Projectile

Over-All length: $7\frac{1}{2}$ inches.
Length of case: $4\frac{1}{8}$ inches.

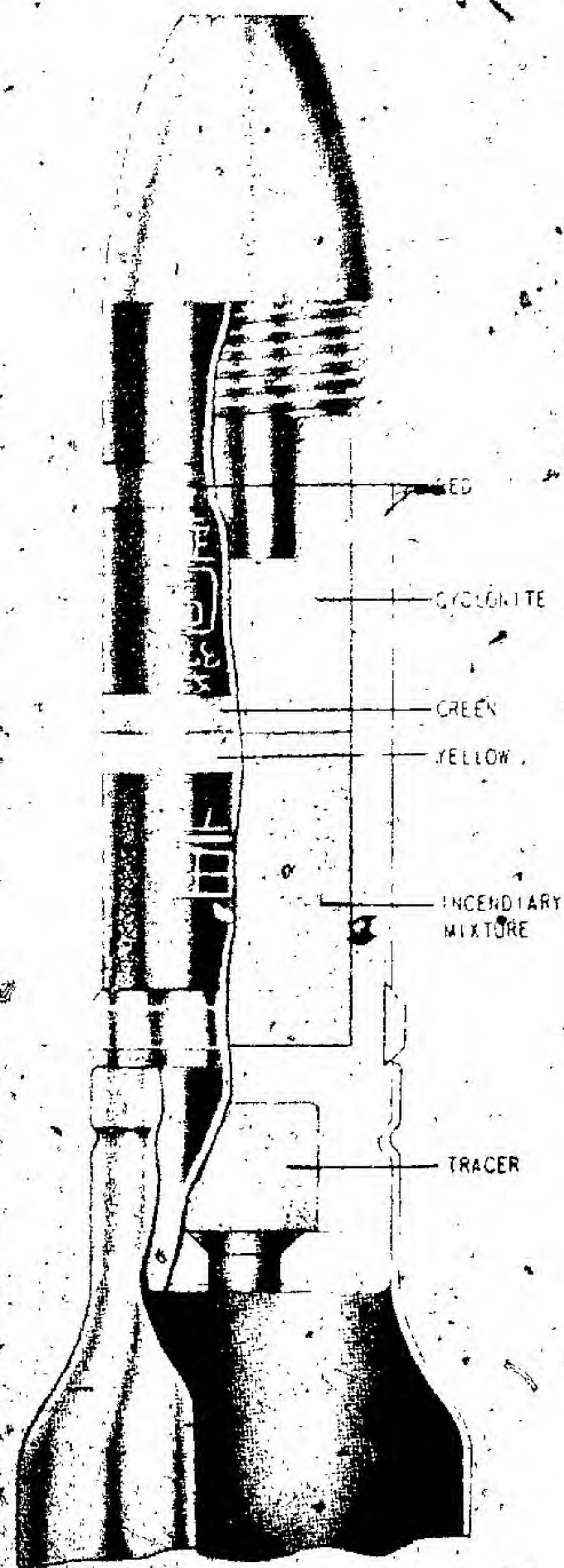


Figure 213—20-mm High-Explosive Incendiary (MA 201) Projectile.

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Length of projectile: $3\frac{1}{4}$ inches.

Weight of projectile: 3.85 ounces.

Filling: P. E. T. N., incendiary composition.

Fuzing: Fuzeless.

Color and markings: Black body with red band abaft bourrelet. Characters **二〇一**

(201) are stenciled on the body.

Weapons in which used: Ho-1 (flexible) and Ho-3 (fixed) aircraft cannon.

Remarks: The projectile is made of steel. A brass nose piece filled with P. E. T. N. threads into the incendiary filled projectile. Detonation of the projectile is accomplished by the crushing action of the P. E. T. N. filled nose piece.

20-mm High-Explosive Incendiary Tracer Projectile

Over-All length: $7\frac{1}{4}$ inches.

Length of projectile: $4\frac{1}{2}$ inches.

Length of case: $4\frac{3}{4}$ inches.

Filling: Cyclonite, incendiary composition, tracer composition.

Fuzing: Type 100 small instantaneous fuze.

Color and markings: Black body with red band just abaft bourrelet, green and yellow bands before rotating band. Characters

旋回機

(flexible or fixed machine cannon)

stenciled on body.

Weapons in which used: Ho-1 (flexible) and Ho-3 (fixed) aircraft cannon.

Remarks: The projectile is made of steel and has two cavities, a main charge cavity and a tracer cavity, separated by a septum. The main charge cavity contains two pellets, the forward one, fitting around the fuze gain, is cyclonite while the after one is an incendiary mixture.

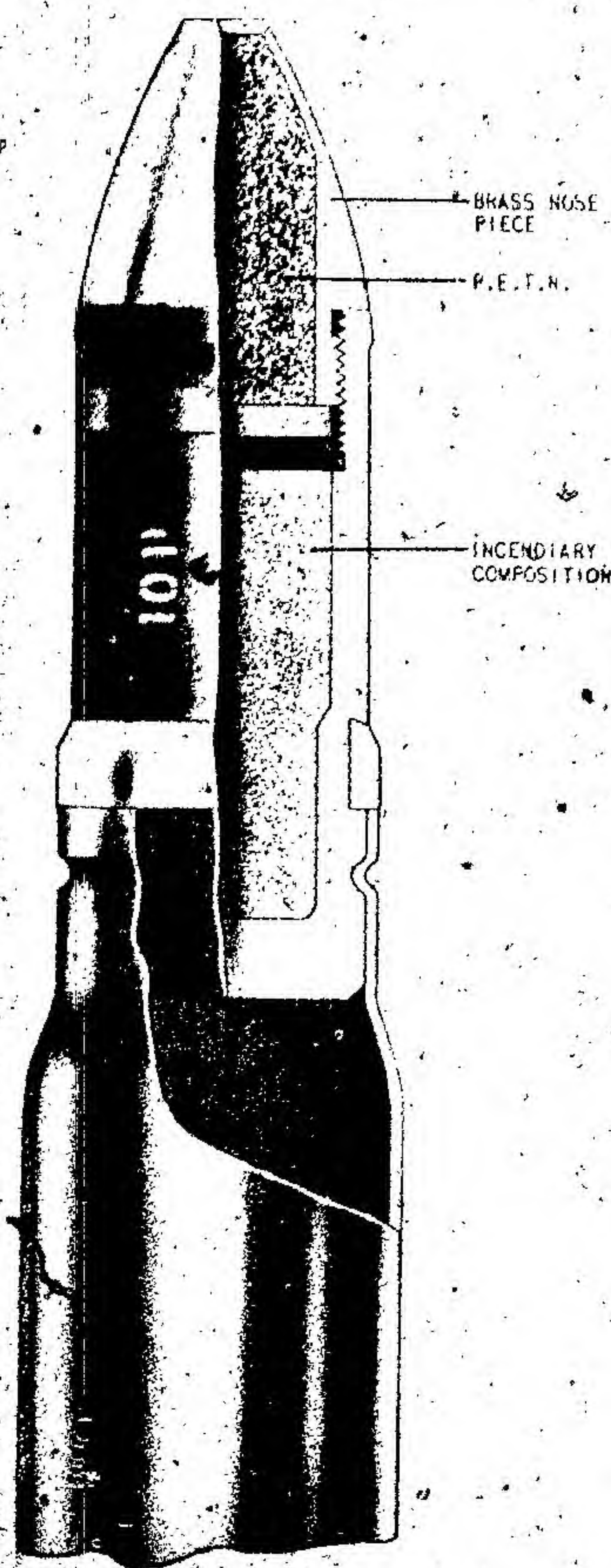


Figure 214—20-mm High-Explosive Incendiary Tracer Projectile.

ARMY PROJECTILES

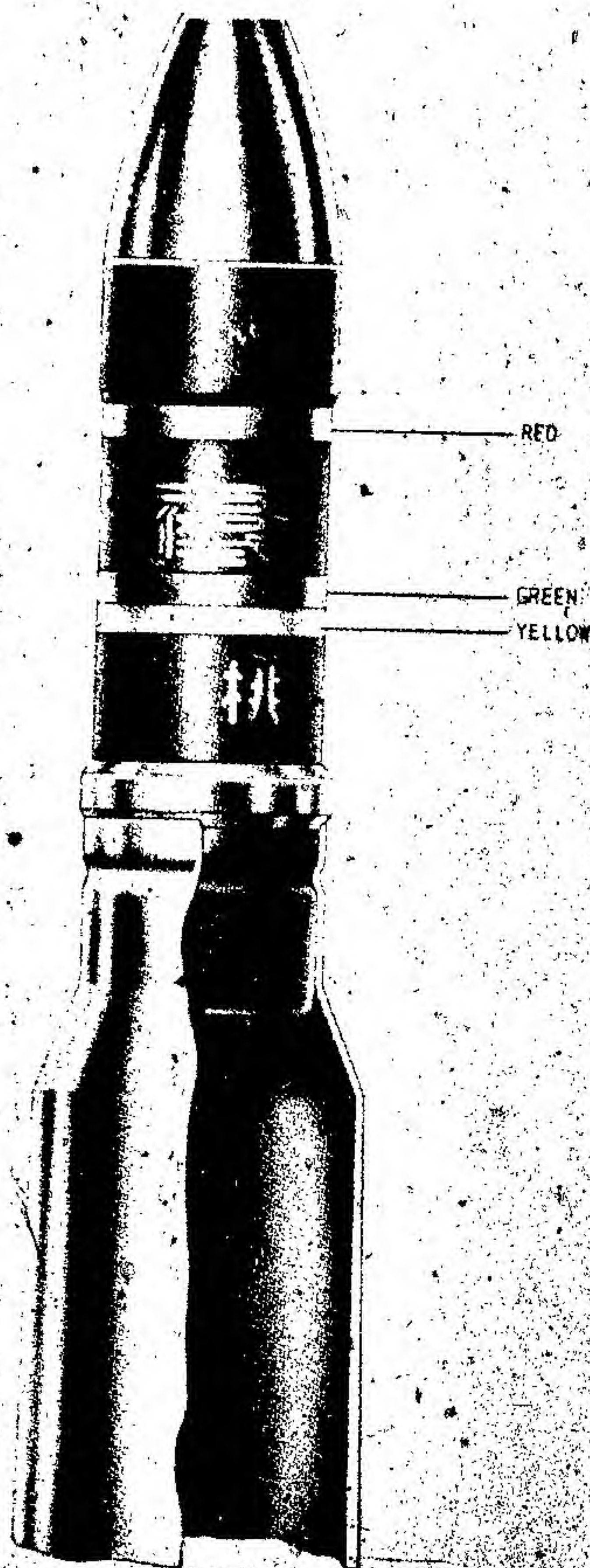


Figure 215—Type 100 Mod 2 20-mm I. T. (Self-Destroying) Projectile.

Type 100 Mod 2 20-mm I. T. (Self-Destroying) Projectile

Over-All length: $8\frac{1}{4}$ inches.

Length of projectile: $3\frac{1}{4}$ inches.

Filling: Incendiary composition, tracer composition.

Fuzing: Type 100 small instantaneous fuze.

Color and markings: Black body with red band just abaft bourrelet, green and yellow bands before rotating band. Characters

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(type 100 Mod 2)

are stenciled on body.

Weapons in which used: Type 98 antiaircraft/antitank gun.

Remarks: This is the same projectile as the type 100 and type 100 Mod 1 H. E. T., but there is no high explosive other than that used in the gaine.

20-mm Armor-Piercing Tracer Projectile

	Type 97A/TK	Ho-1 and Ho-3
Over-all length	7 $\frac{1}{2}$ inches	7 $\frac{1}{2}$ inches
Length of case	4 $\frac{1}{2}$ inches	4 $\frac{1}{2}$ inches
Length of projectile	3 $\frac{1}{2}$ inches	3 $\frac{1}{2}$ inches
Weight of projectile	5.5 ounces	5.5 ounces

	Type 98 A.A. A/TK
Over-all length	8 $\frac{1}{4}$ inches
Length of case	5 $\frac{1}{4}$ inches
Length of projectile	3 $\frac{1}{2}$ inches
Weight of projectile	5.5 ounces
Filling: Tracer composition.	

Color and marking: Hard round (type 100): black body, green and white bands before rotating band medium-round (type 97): has

一〇〇式

(type 100)

stenciled on the body, black body, green band before rotating band soft round (type 97 substitute): black over-all.

Weapons in which used: Type 97 antitank gun, Ho-1 (flexible) and Ho-3 (fixed) aircraft cannon, type 98 antiaircraft/antitank gun.

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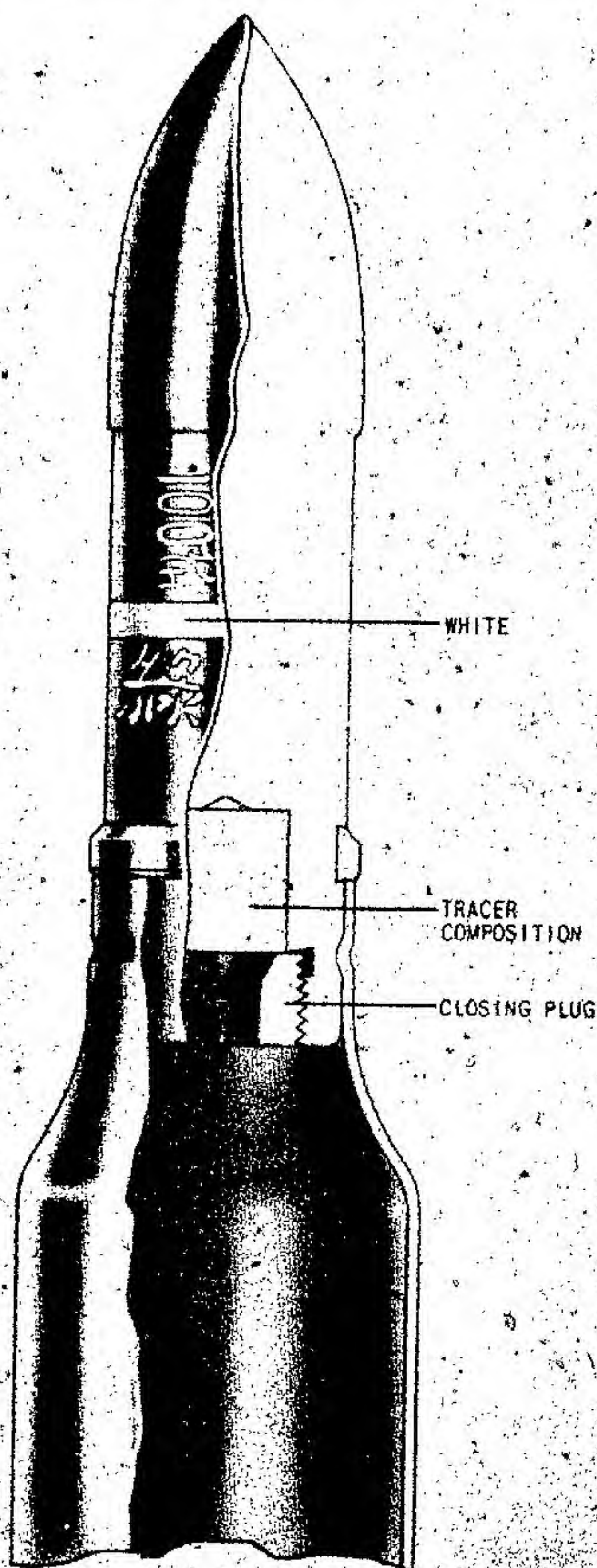


Figure 216—20-mm Armor-Piercing Tracer Projectile.

Remarks: This projectile is a solid steel shot with a tracer cavity drilled into the base. This projectile, with different colored tracers and markings, is used in three guns. There are three types of rounds differing in grades of hardness of steel.

Ho-5 20-mm Ammunition

The latest Army 20-mm gun developed is the Ho-5 aircraft gun which is of excellent design and

represents a considerable improvement over previous Army 20-mm aircraft machine guns.

Case:

Length: $3\frac{1}{16}$ inches.

Diameter of base: $\frac{3}{16}$ inches.

Material: Brass.

Weight (empty): 113.5 grams.

The case is of the rimless type and has a slight taper toward the neck.

Propellant: The propellant is 21.4 grams of graphited smokeless powder in fine cylindrical grains.

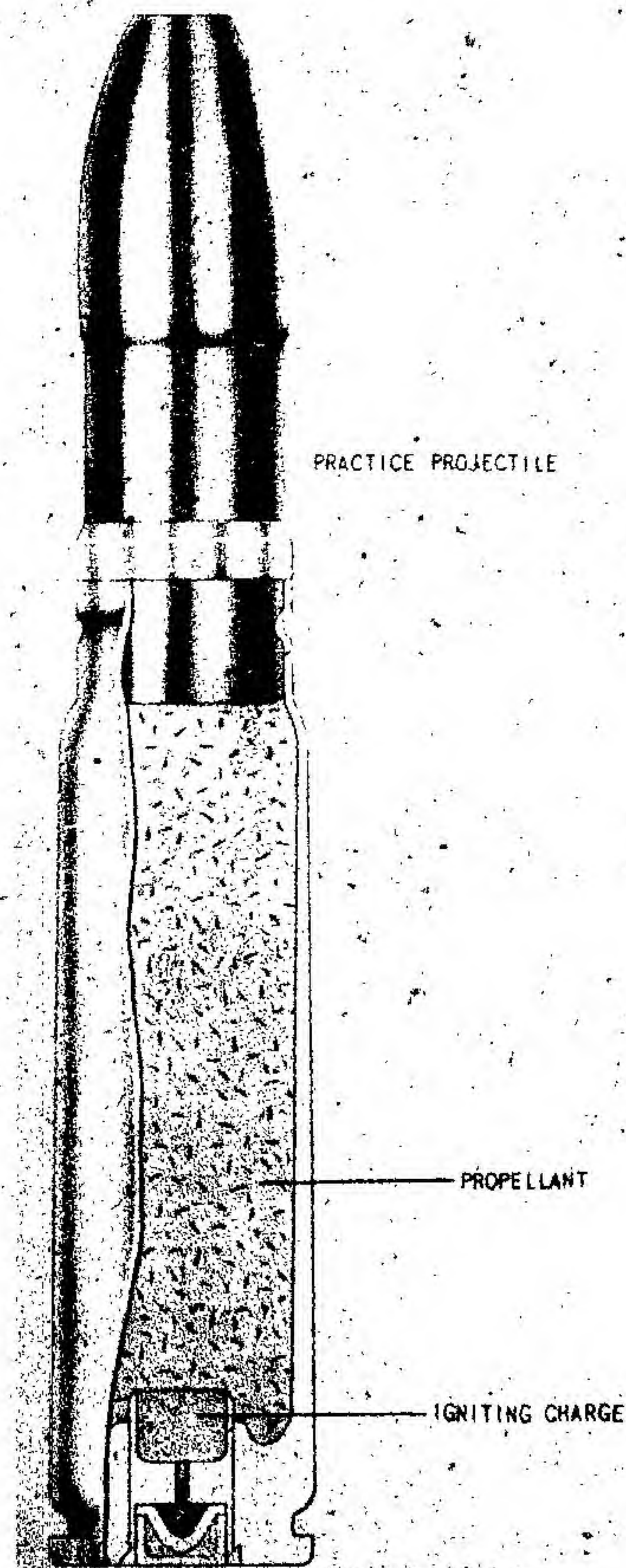


Figure 217—HO-5 20-mm Ammunition.

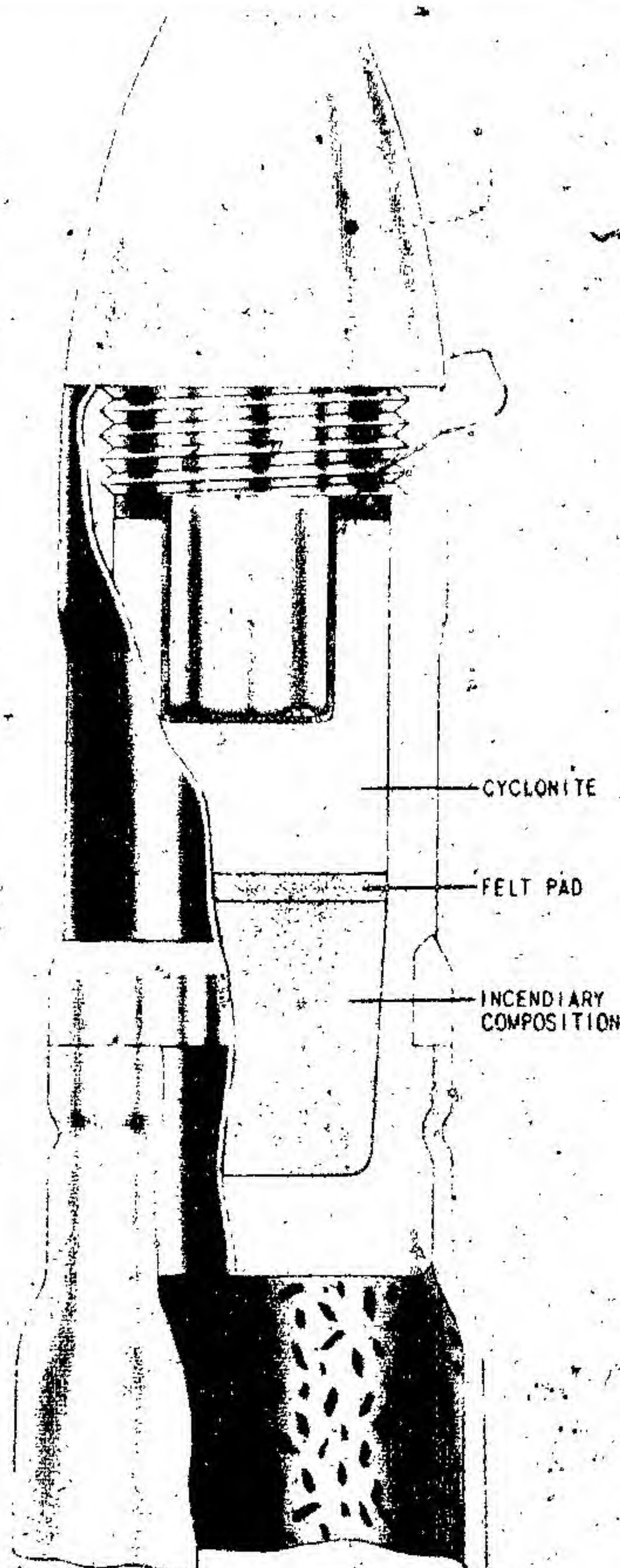


Figure 218—Type 2 and Type 2 Modified 20-mm High-Explosive Incendiary Projectile.

Type 2 and Type 2 Modified 20-mm H. E. I. Projectile

Over-all length: 5 $\frac{1}{4}$ inches.

Length of projectile: 2 $\frac{1}{8}$ inches (fuzed).

Weight of projectile: 77.4 grams (fuzed).

Weight of filling:

Cyclonite, type 2 modified: 3.4 grams.

Cyclonite, type 2: 0.4 grams.

Incendiary composition: 3.7 grams.

Filling: Cyclonite and incendiary composition.

Fuzing:

Type 2: Type 2 Small Instantaneous or type 2 small instantaneous modified fuze.

Type 2 Modified: Type 4 super-detonating fuze.

Color and markings:

The type 2 projectile is painted black over all and in some cases has a yellow band around body.

Type 2 modified projectile is painted silver-gray over all.

Remarks: The difference between the type 2 and the type 2 modified is in the fuze. The type 2 projectile uses a fuze that has an external gaine and thus has less explosive filling than the type 2 modified projectile which uses a fuze with the gaine built into the fuze body.

Type 4 20-mm H. E. T. (Ma 202) Projectile

Over-all length: 5 $\frac{1}{4}$ inches.

Length of projectile: 2 $\frac{1}{8}$ inches.

Weight of projectile: 78.2 grams (fuzed).

Weight of filling:

P. E. T. N.: 3.2 grams.

Incendiary composition: 8.7 grams.

Filling: P. E. T. N. and incendiary composition (barium nitrate, aluminum powder, magnesium powder, and wax).

Fuzing: Fuzeless.

Color and markings: Black over all with characters $\equiv \odot \equiv$ (202) stenciled on the body.

Remarks: The projectile is made of steel with a brass nose piece threaded to it. The nose piece is filled with P. E. T. N. and is designed to explode by the crushing action of impact. An

JAPANESE EXPLOSIVE ORDNANCE

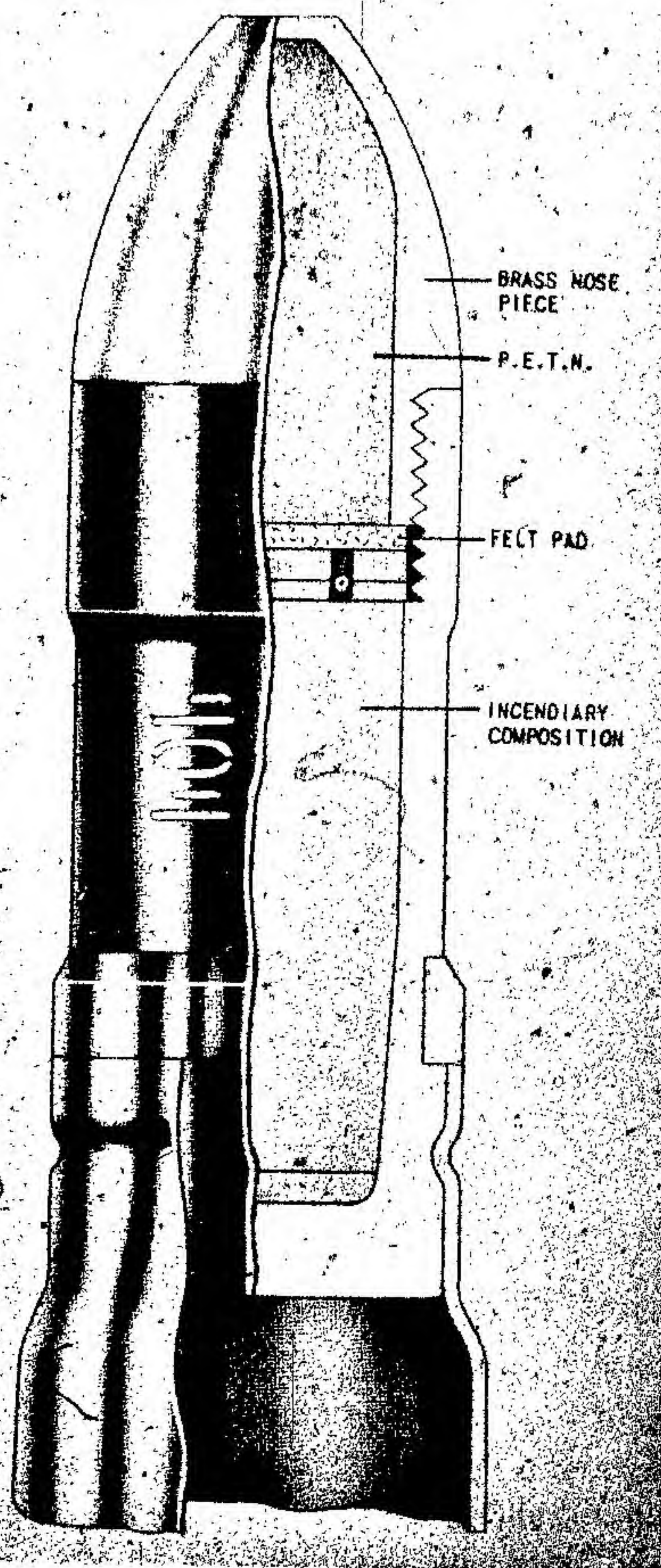


Figure 219—Type 4 20-mm High-Explosive Incendiary (MA 202) Projectile.

incendiary mixture contained in the steel body is separated from the high explosive by a felt pad and a threaded brass disc. This disc has two lead-in holes.

Type 2 20-mm Armor-Piercing Tracer Projectile

Over-All length: 5 $\frac{1}{4}$ inches.

Length of projectile: 2 $\frac{1}{4}$ inches.

Weight of projectile:

Soft round: 112.7 grams.

Medium round: 116.7 grams.

Hard round: 119.5 grams.

Weight of filling: 7.0 grams.

Filling: Tracer composition

Color and markings:

Soft round: black over-all.

Medium round: black with green band around body.

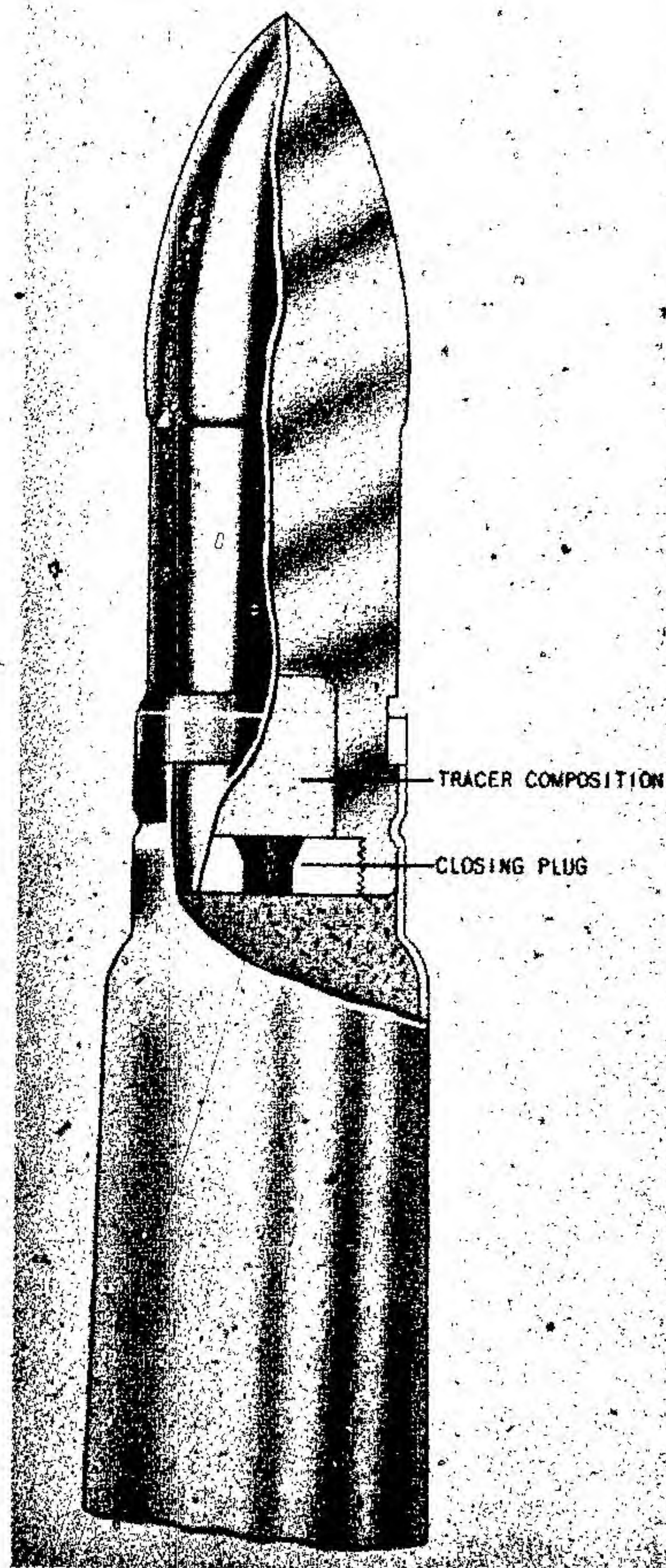


Figure 220—Type 2 20-mm Armor-Piercing Tracer Projectile.

Hard round: Black with a green and a white band around body. Characters

二式

(type 2)

are stenciled on the body.

Remarks: There are three different models of this projectile differing in the grades of hardness of the steel. This difference is indicated by the color markings.

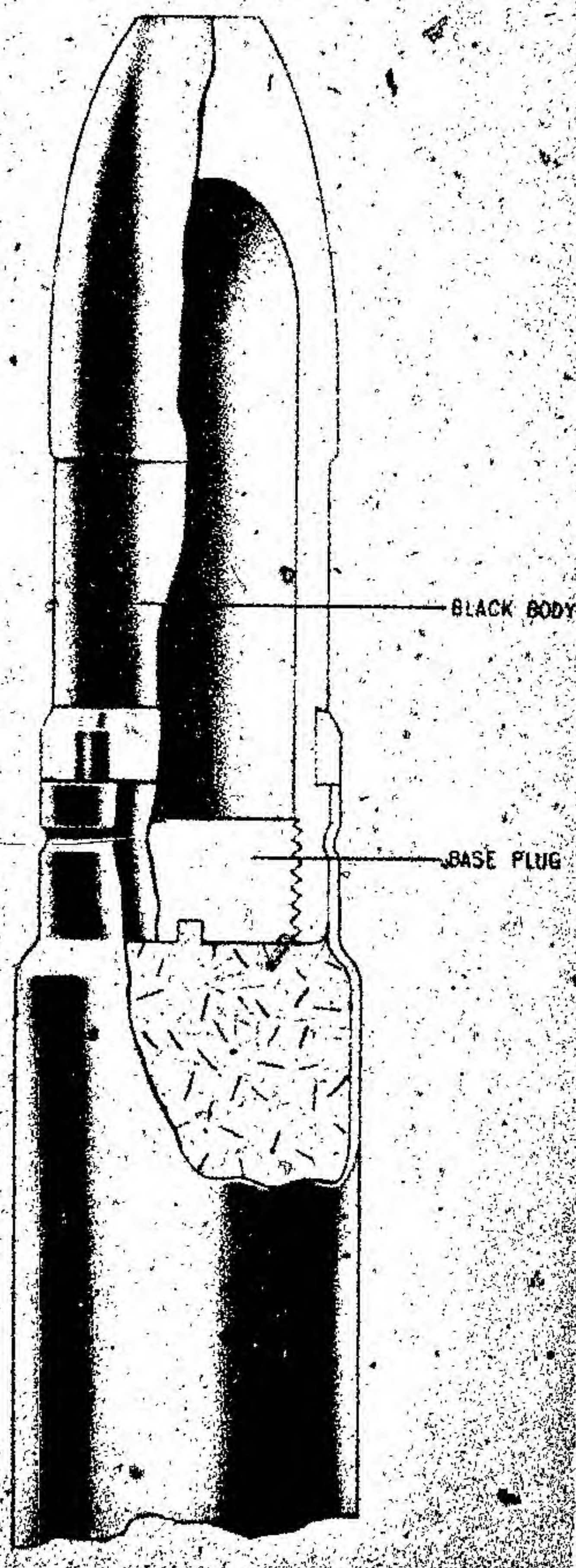


Figure 221—20-mm Practice Projectile.

20-mm Practice Projectile

Over-All length: 5 $\frac{1}{4}$ inches.

Length of projectile: 2 $\frac{1}{8}$ inches.

Weight of projectile: 81.0 grams.

Filling: None.

Color and markings: Black over-all.

Remarks: The projectile approximates the shape of the type 2 H.E.I. projectile. It is unfilled and closed at the base by a threaded plug.

37-mm High-Explosive Incendiary Projectile

Over-all length of projectile: 89 mm (3 $\frac{1}{2}$ inches) without fuze.

Length of complete round: 197 mm (7 $\frac{7}{8}$ inches) fuze.

Diameter at bourrelet: 37 mm (\pm tol.).

Width of rotating band: 10 mm ($\frac{3}{8}$ inch).

Weight of projectile filled: 436.2 grams.

Filling: Cyclonite and incendiary mixture.

Weapons in which used: Ho-203 aircraft cannon.

Case:

Length: 111.5 mm.

Diameter at base: 47.0 mm.

Weight (empty): 226.5 grams.

The case is comparatively short, made of brass, and is slightly necked.

Propellant: Graphited smokeless powder in flat 4-mm squares poured loosely into the case and sealed in with a cardboard disc. The weight of the propellant is 59.8 grams.

Color and markings: Black body, red nose band, yellow body band. Characters

ホ 二 〇 三

(Ho 203)

are stenciled on the body.

Fuzing: Type 100 small instantaneous fuze.

Remarks: This projectile is constructed in two pieces. It has a nearly straight-sided main body and an ogival-shaped nose piece which threads into the main body. The main charge is cyclonite and an incendiary mixture. The incendiary mixture is pressed into the base of the cavity, with the cyclonite filling the remainder of the cavity and the nose piece.

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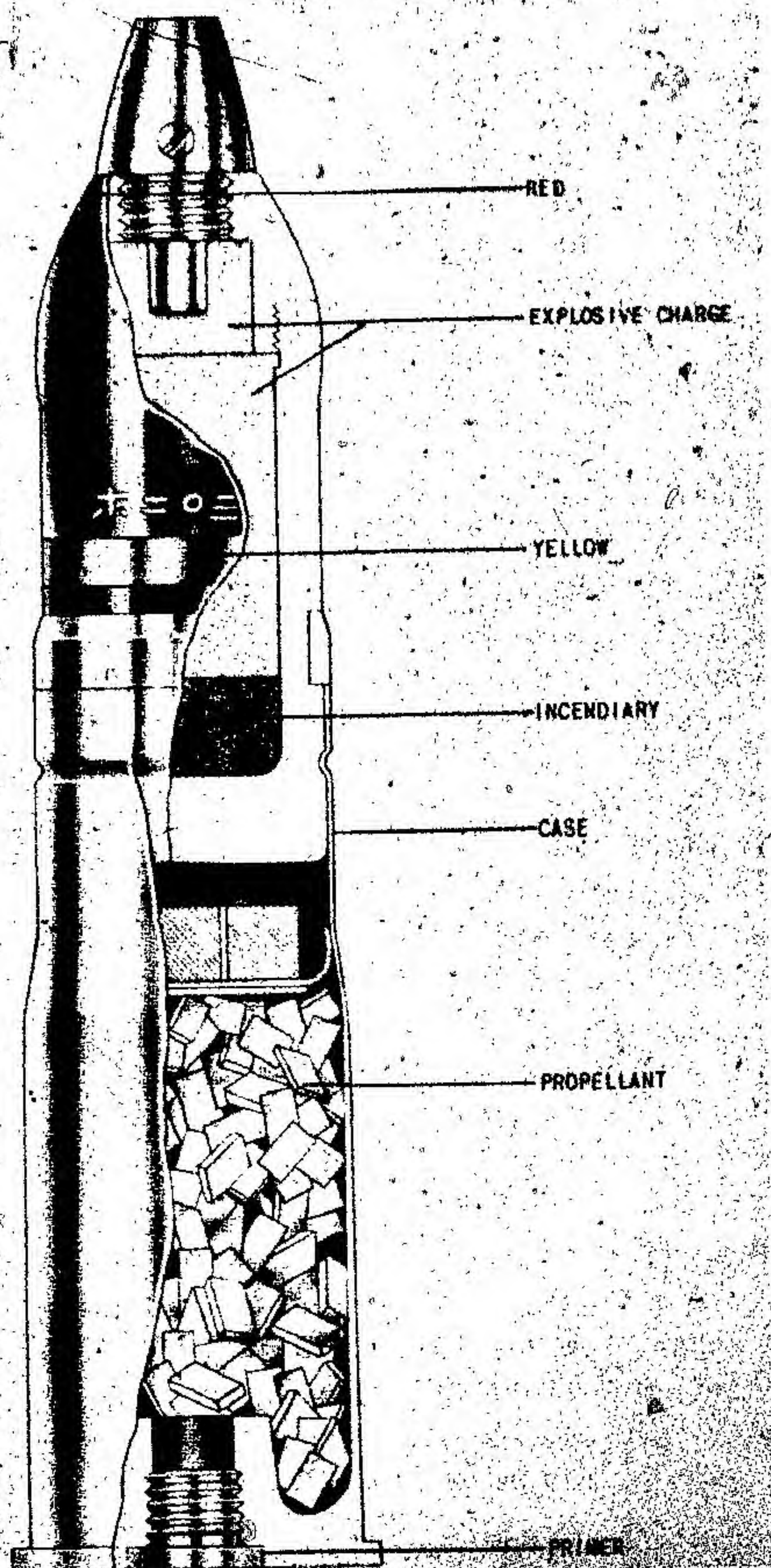


Figure 222—37-mm High-Explosive Incendiary Projectile.

There is also an empty practice projectile similar in appearance to the H. E. I. but having the nose piece and dummy fuze constructed in one piece. The projectile is painted black over-

all and has **ホニ三** (Ho 203) and

マ四三八 (Ma 438)

stenciled on the body.

37-mm High-Explosive Incendiary Projectile

Over-all length of projectile: .89 m (3½ inches) without fuze.

Length of complete round: 246 mm (9¾ inches) fuze.

Diameter at bourrelet: 37 mm (± tol.).

Width of rotating band: 10 mm.

Weight of projectile empty: 398.3 grams.

Filling: Mixture of cyclonite and wax and incendiary composition.

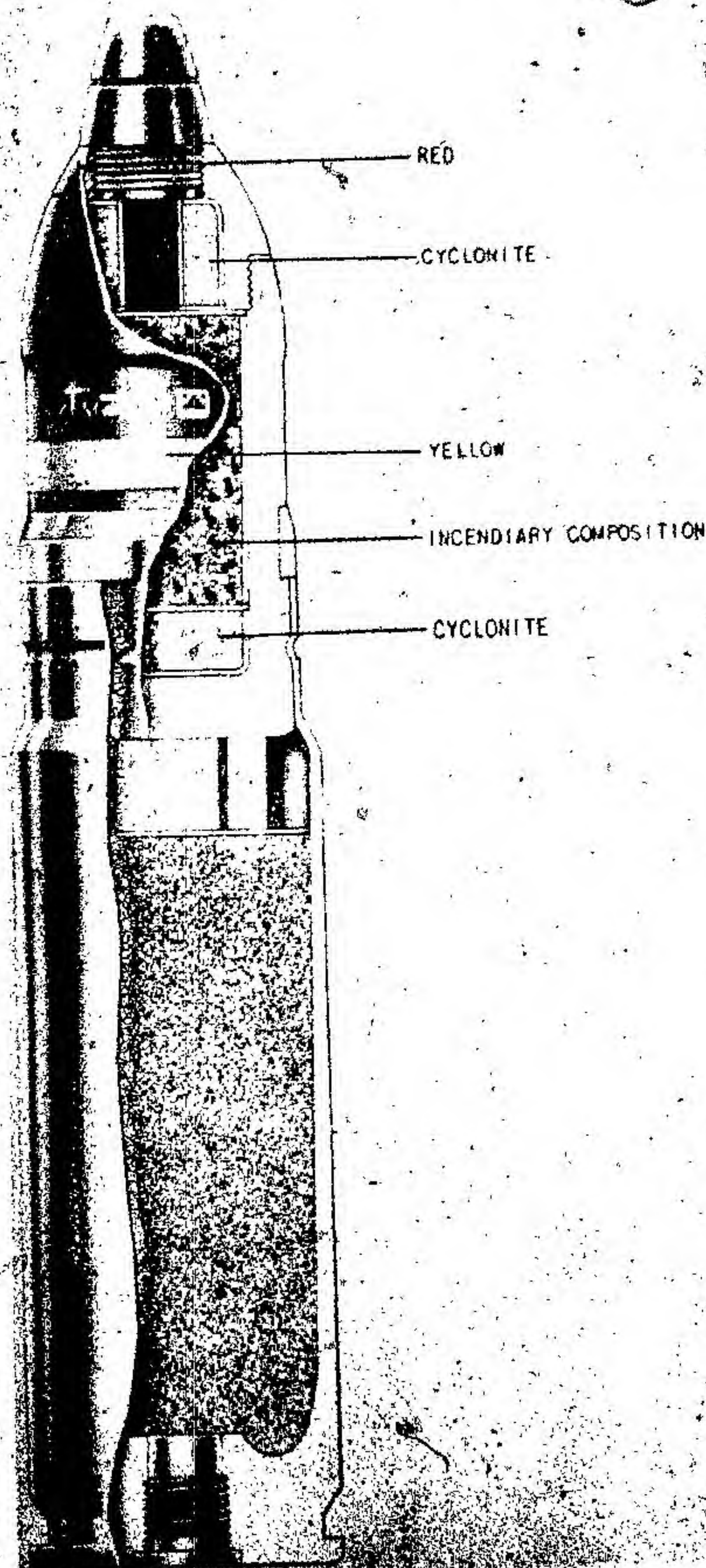


Figure 223—37-mm High-Explosive Incendiary Projectile.

Weapons in which used: Ho 204 aircraft cannon.

Case:

Length: 144.0 mm.

Diameter at base: 43.5 mm.

Weight (empty): 381.2 grams.

The case is of the rimless type and is slightly necked.

Propellant: Graphited smokeless powder in flat 4 mm squares poured loosely into the case and sealed in with a cardboard disk. The weight of the propellant is 75.1 grams.

Color and markings: Black body, red nose tip, yellow body band. Characters



(Ho 204)

are stenciled on the body.

Fuzing: Type 4 super-detonating fuze.

Remarks: The ammunition for the Ho 204 uses the same projectile as the Ho 203 ammunition, but the case is longer.

The projectile is constructed in two pieces: a straight sided main body and an ogival-shaped nose which screws into the main body. There is only one cavity into which both the incendiary and high-explosive filling are pressed.

37-mm Practice Projectile

Over-all length of projectile: 124 mm (4 7/8 inches).

Length of case: 144 mm (5 3/4 inches).

Length of complete round: 247 mm (9 13/16 inches.)

Diameter at bourrelet: 37 mm (\pm tol.).

Width of rotating band: 8 mm.

Filling: Sawdust.

Weapons in which used: Ho 204 aircraft cannon.

Color and markings: Black over-all.

Fuzing: None.

Remarks: This projectile has the appearance of an A. P. projectile. It is sawdust filled and has the cavity closed by a base plug.

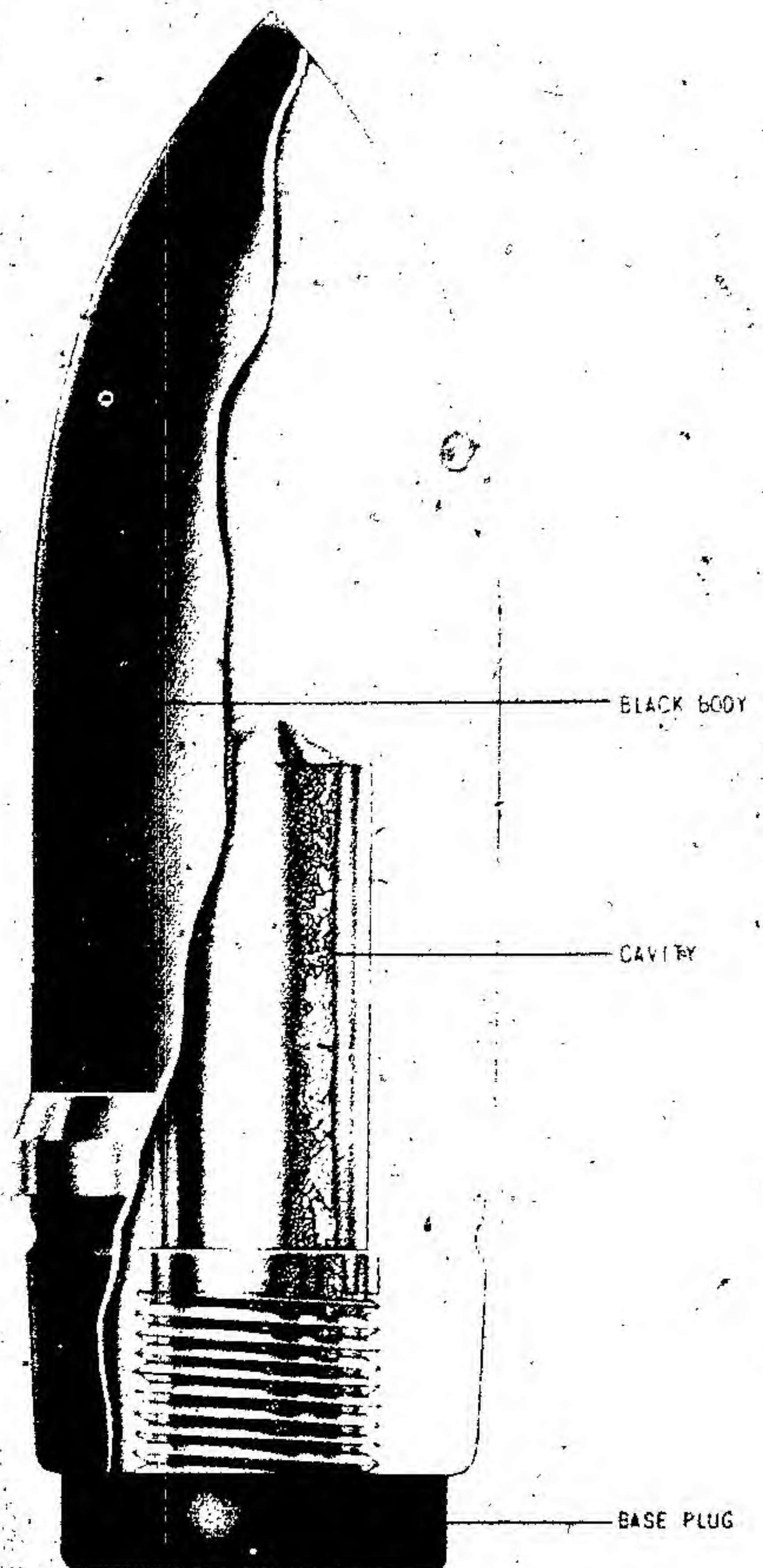


Figure 224—37-mm Practice Projectile.

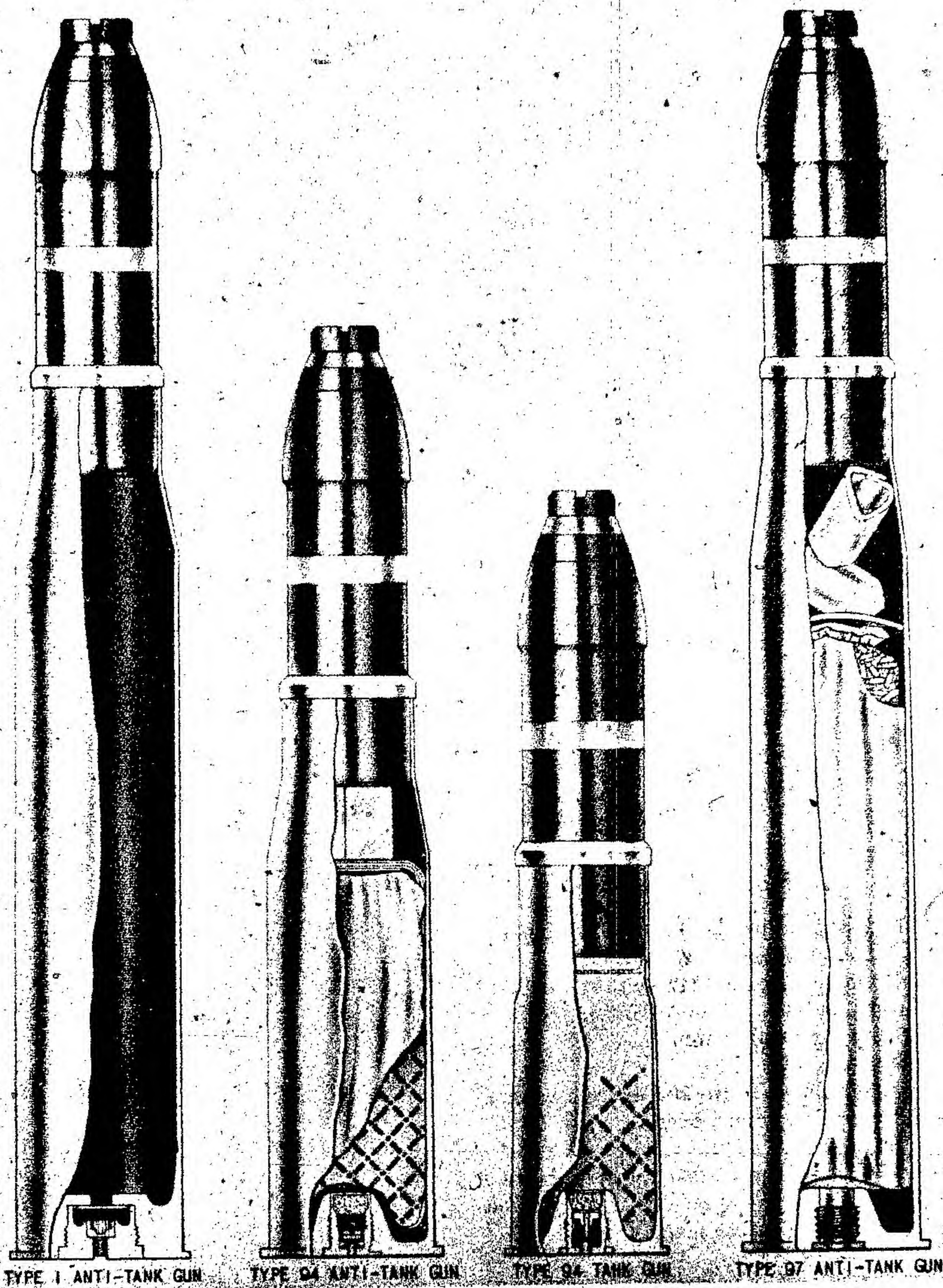


Figure 225—37-mm Ammunition.

37-mm Ammunition

There are eight 37-mm antitank and tank guns, all sizes of which use the same projectiles but have different cartridge cases. Presented below is information on the cases and the propellant.

Cases:

Gun	Diameter at base (inches)	Weight (empty) (ounces)	Case length (inches)	Markings
Type 11th year infantry		7.6	4%	十一平歩
Type 94 tank	1 $\frac{3}{4}$	9.4	5%	九四戰
Type 94 antitank*	2%	13.0	6%	九四石包
Type 98 tank*	2%	13.0	6%	九八戰
Type 100 tank*	2%	13.0	6%	一〇〇戰
Type 97 antitank**	2	15.1	9%	
Type 1 antitank**	1 $\frac{1}{4}$	22.7	9%	
Type 1 tank	1 $\frac{1}{4}$	22.7	9%	一戰

*Since the type 94 antitank, type 98 tank, and type 100 tank guns use the same cartridge case, cases will be found marked for individual guns or for all three guns.

**The cases for the type 97 and type 1 antitank guns can be distinguished by the fact that the type 97 is almost straight, whereas the type 1 has a pronounced neck. The type 1 tank and type 1 antitank guns use the same case.

Propellant:

Type 11th year infantry gun: 1.85 oz. of graphited smokeless powder in the form of flakes poured into the case and sealed with a cardboard closing disc.

Type 94 tank gun: 2.7 oz. of graphited smokeless powder in the form of rectangular flakes.

Type 94 antitank gun, type 98 gun, and type 100 tank gun: 4.3 ounces of graphited smokeless powder in the form of unitubular grains contained in a silk bag.

Type 97 antitank gun: 5.0 ounces of graphited smokeless powder in the form of short, cylindrical grains contained in a silk bag.

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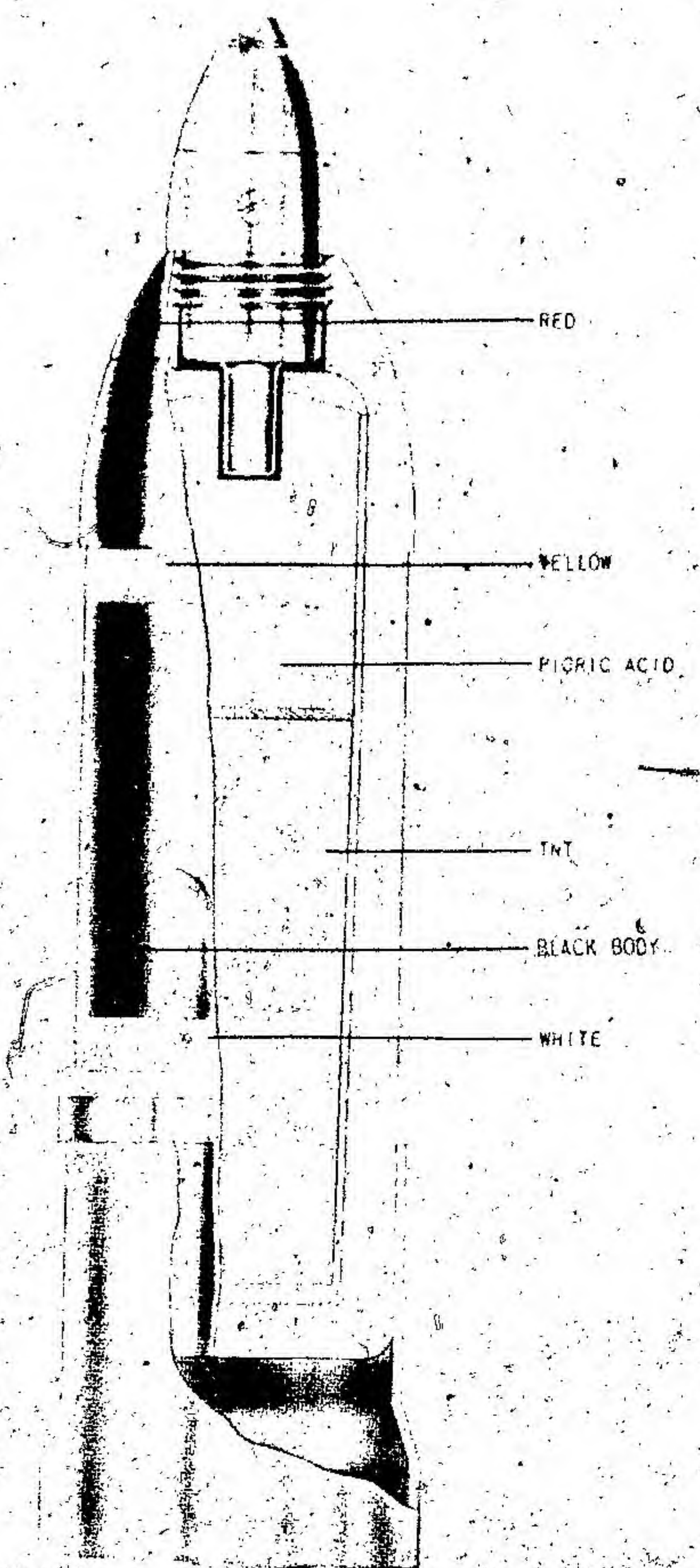


Figure 226—37-mm Type 94 High-Explosive Projectile.

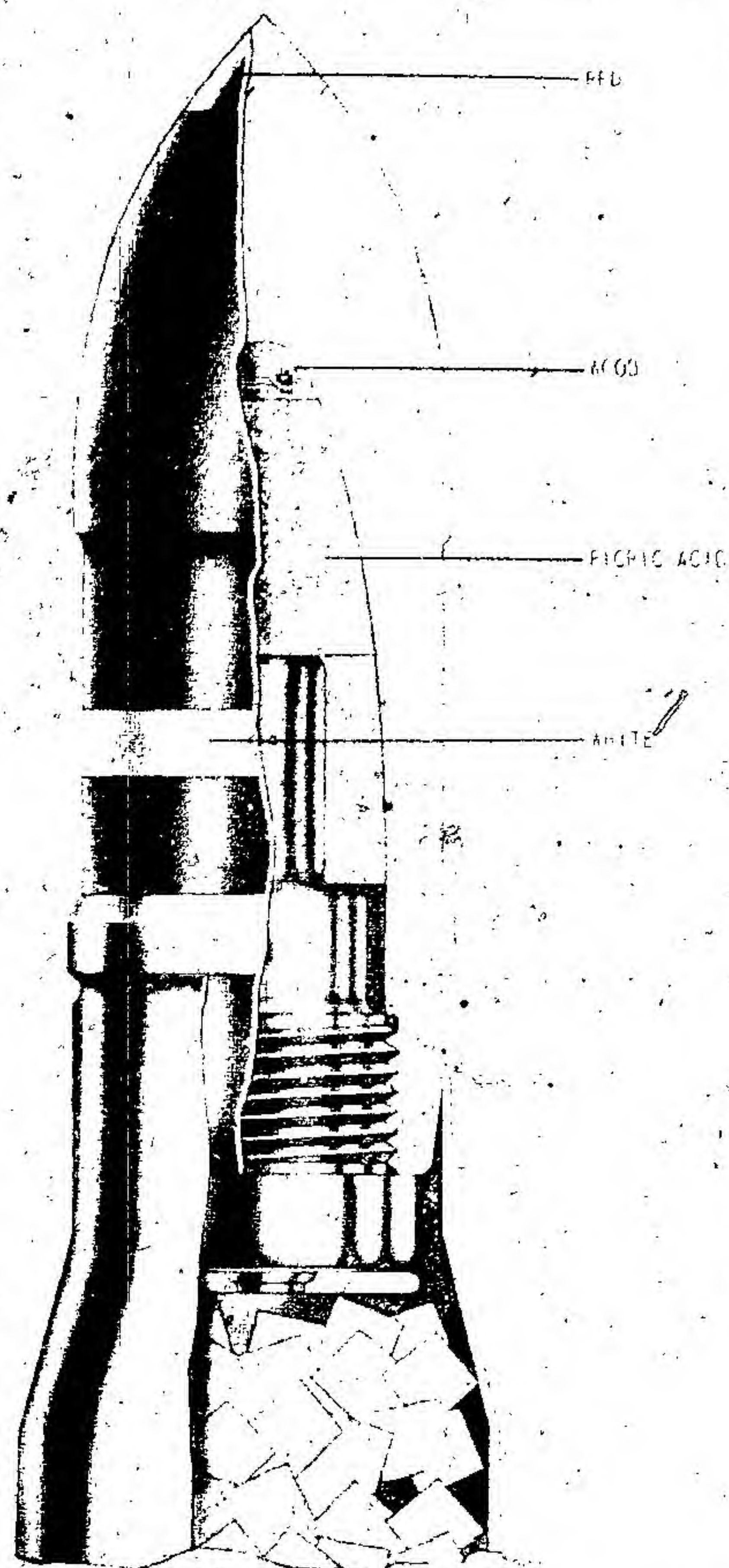


Figure 227—Type 94 37-mm Armor-Piercing High-Explosive Projectile.

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Type 94 37-mm High-Explosive Projectile

	Type 97 A/TK	Type 94 A/TK	Type 94 TK	Type 1 A/ TK Type 1 TK	Type 11th Yr. Inf.
Over-all length of projectile	125 mm	125 mm	125 mm	125 mm	125 mm
	w/o fuze.	w/o fuze.	w/o fuze.	w/o fuze.	w/o fuze.
Length of complete round	349 mm	266 mm	223 mm	349 mm	221 mm
	fuzed.	fuzed.	fuzed.	fuzed.	fuzed.
Diameter at bourrelet	37 mm	37 mm	37 mm	37 mm	37 mm.
Width of rotating band	8 mm	8 mm	8 mm	8 mm	8 mm.

Weight of projectile filled: 595.1 grams.

Filling: Picric acid and TNT.

Weapons in which used: All 37-mm guns.

Color and markings: Black body, red nose band, yellow body band (some rounds may have white body band added).

Fuzing: Type 93 small instantaneous fuze.

Remarks: This steel projectile is filled with TNT and picric acid. The after two-thirds of the projectile cavity is filled with high grade east TNT. The forward one-third of the projectile cavity is filled with picric acid. The entire bursting charge is enclosed in a heavy waxed paper casing with a double thickness between the TNT and picric acid charge.

Type 94 37-mm Armor-Piercing High-Explosive Projectile

	Type 94 TK	Type 94 A/TK	Type 97 A/TK	Type 11th Yr. Inf.
Over-all length of projectile	114 mm	114 mm	114 mm	114 mm
	w/o fuze.	w/o fuze.	w/o fuze.	w/o fuze.
Length of complete round	228 mm	262 mm	345 mm	218 mm
	fuzed.	fuzed.	fuzed.	fuzed.
Diameter at bourrelet	37 mm	37 mm	37 mm	37 mm.
Width of rotating band	9.5 mm	9.5 mm	9.5 mm	9.5 mm.

Weight of projectile filled: 1 pound 1/4 ounce

Filling: Picric acid.

Weapons in which used:

Type 11th year Infantry gun.

Type 94 TK gun.

Type 94 antitank gun.

Type 97 antitank gun.

Type 98 TK gun.

Type 100 TK gun.

Color and markings: Black body, red nose tip, white body band.

Fuzing: Type 94 small-delay base fuze.

Remarks: This projectile is made of high grade steel. The main charge cavity contains a small wooden plug in the forward portion and a paper covered picric acid charge aft of the wooden nose plug. The Type 94 small delay base fuze screws into the base of the projectile, also acting as a base plug.

JAPANESE EXPLOSIVE ORDNANCE

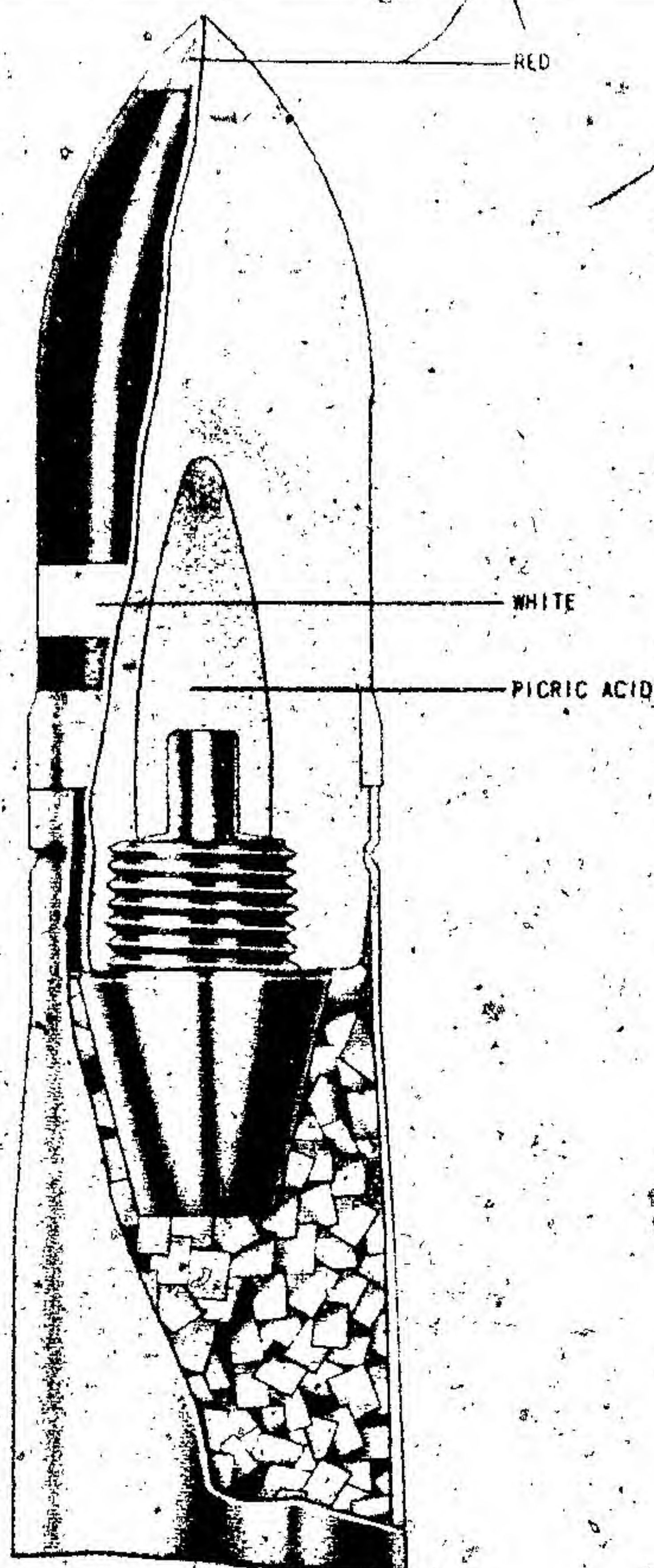


Figure 228—Type 1 37-mm High-Explosive Projectile.

Type 1 37-mm High-Explosive Projectile

	Type 94 A/TK	Type 1 A/TK
Over-all length of projectile.....	104 mm w/o fuze.	104 mm w/o fuze.
Length of complete round.....	250-mm fuzed.	333-mm fuzed.
Diameter at bourrelet.....	37 mm.	37 mm.
Width of rotating band.....	11 mm.	11 mm.
Weight of projectile: 1 pound 6 ounces without explosive.		
Filling: Picric acid.		
Weapons in which used:		
Type 1 tank gun.		
Type 1 antitank gun.		
Type 94 antitank gun.		

Color and markings: Black-body, red nose tip, white body band.
Fuzing: Small Mk 1 base fuze.

Remarks: This projectile is constructed of high grade steel. It has no sharply defined bourrelet. It uses a small Mk 1 base fuze which also acts as a base plug.

40-mm Ho-301 High-Explosive Projectile

Projectile Dimensions:

Length of projectile (fuzed): 129 mm (5 1/4 inches) fuzed.

Length of projectile (without fuze): 108 mm (4 1/4 inches).

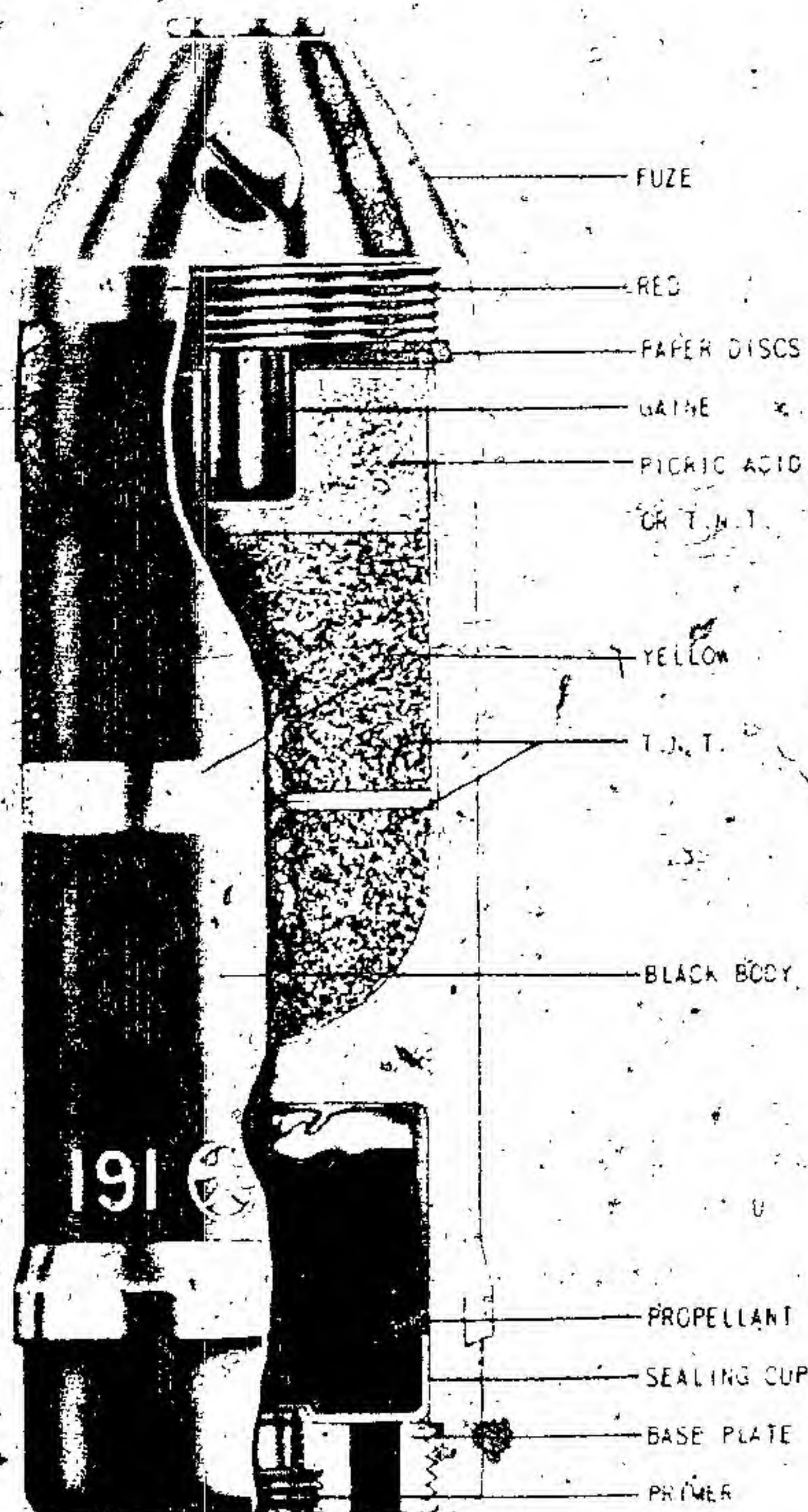


Figure 229—40-mm HO-301 High-Explosive Projectile.

Distance base to rotating band (lower edge): 15 mm ($1\frac{1}{2}$ inch).

Width of rotating band: 8 mm ($\frac{1}{2}$ inch).

Diameter of rotating band: 41 mm ($1\frac{1}{2}$ inches).

Diameter of body: 39 mm ($1\frac{1}{2}$ inches).

Diameter of bourrelet: 39.5 mm ($1\frac{1}{2}$ inches).

Width of bourrelet: 6 mm ($\frac{1}{4}$ inch).

Distance base to bourrelet (lower edge): 91 mm ($3\frac{1}{2}$ inches).

Wall thickness (propellant chamber): 5 mm ($\frac{1}{4}$ inch).

Wall thickness (H. E. chamber): 4 mm ($\frac{1}{4}$ inch).

Weights:

Complete round fused: 1 pound, 4.7 ounces.

H. E. charge: 2 ounces.

Propellant: 0.4 ounce (10 grams).

Primer: 0.1 ounce.

Fuze, with gaine: 2.1 ounces.

Gaine: 0.2 ounce.

Primer Dimensions:

Length: 9 mm ($1\frac{1}{2}$ inch).

Diameter (threads): 12 mm ($1\frac{1}{2}$ inch).

T. P. I.: 34 L. H.

Weapon in which used: (Ho 301 40-mm aircraft cannon): This is an unusual weapon similar in design to an Oerlikon blow-back operated cannon, but with the head of the bolt machined

as a piston which closes the breech at the forward end of its stroke.

Filling: The filling consists of TNT with a forward pellet of picric acid or TNT.

Propellant: The propellant consists of small, greenish-gray, square flakes of smokeless powder (approximately 1 mm square) enclosed in a silk bag which is inserted in the after cavity of the projectile. A sealing cup of thin aluminum fits around the after end of the propellant bag and the charge and cup are held in by a perforated base plate which screws (L. H.) into the base of the cavity. The base plate has an outer ring of twelve $\frac{1}{8}$ -inch holes and a central hole threaded (L. H.) to receive the small flush primer. The aluminum sealing cup is perforated by a single hole in the center to permit the flash from the primer to reach the propellant. The force of the propellant gases blows through the aluminum cup to open the main series of holes.

Fuze: This is a simple direct-acting nose fuze with a central axial striker held in the unarmed condition by a slotted safety block which in turn is held by two spring-loaded detents.

Remarks: There is also a practice projectile which has the same dimensions and appearance as the H. E. projectile. It is painted black over all and has a nose plug instead of a fuze.

Type 1 47-mm High-Explosive Projectile

Weight of complete round: 2.44 kg. (5.4 pounds).

Weight of projectile (without fuze): 1.15 kg. (2.5 pounds).

Weight of filling: 0.087 kg. (0.2 pound).

Filling: Two reformed paper-wrapped blocks taped together and waxed. The forward block consists of two pellets of picric acid—a ring pellet around the gaine and a solid pellet beneath the gaine. The after block is one piece of cast TNT.

Diameter at bourrelet: 47 mm (minus tol.).

Length of projectile (without fuze): 140 mm ($5\frac{1}{2}$ inches).

Length of propellant case: 283 mm ($11\frac{1}{2}$ inches).

Length of assembled round (without fuze): 389 mm ($15\frac{1}{2}$ inches).

Diameter of base of case: 72 mm ($2\frac{1}{2}$ inches).

Weapons in which used:

Type 1 antitank gun.

Type 1 tank gun.

Fuzing: Type 88 Inst. Nose fuze (gun type), type 88 short-delay nose fuze (gun type).

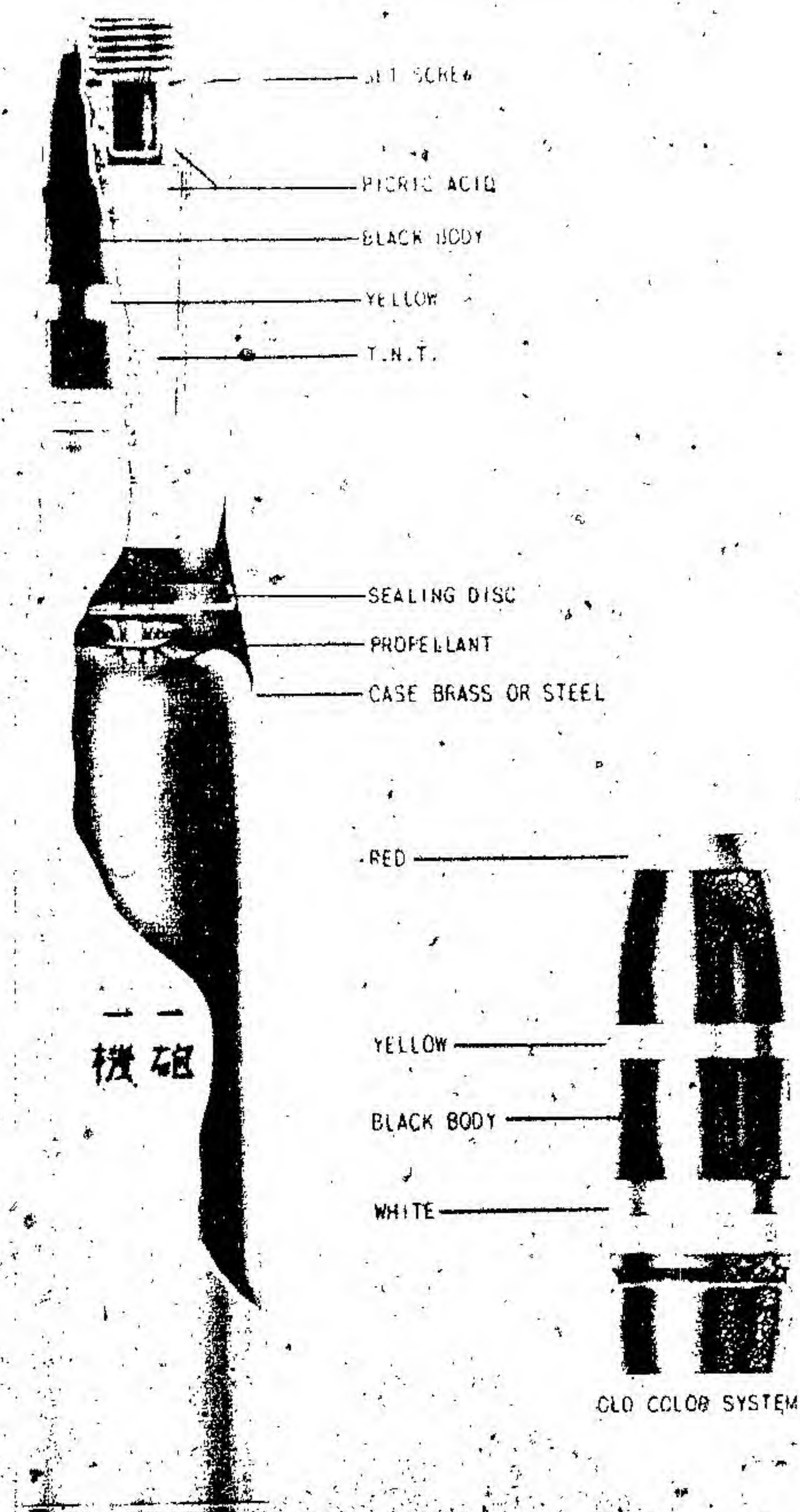


Figure 230—Type 1 47-mm High-Explosive Projectile.

Weight of propellant: 0.398 kg. (0.9 pound).

Propellant: Single perforated cylindrical grains ($\frac{1}{8}$ inch long, $\frac{1}{8}$ inch diameter) of a graphited double-base powder of the following composition:

Nitrocellulose: 60.0 percent.
 Nitroglycerine: 34.5 percent.
 Ethyl centralite: 3.0 percent.
 Diphenyl formamide: 2.5 percent.

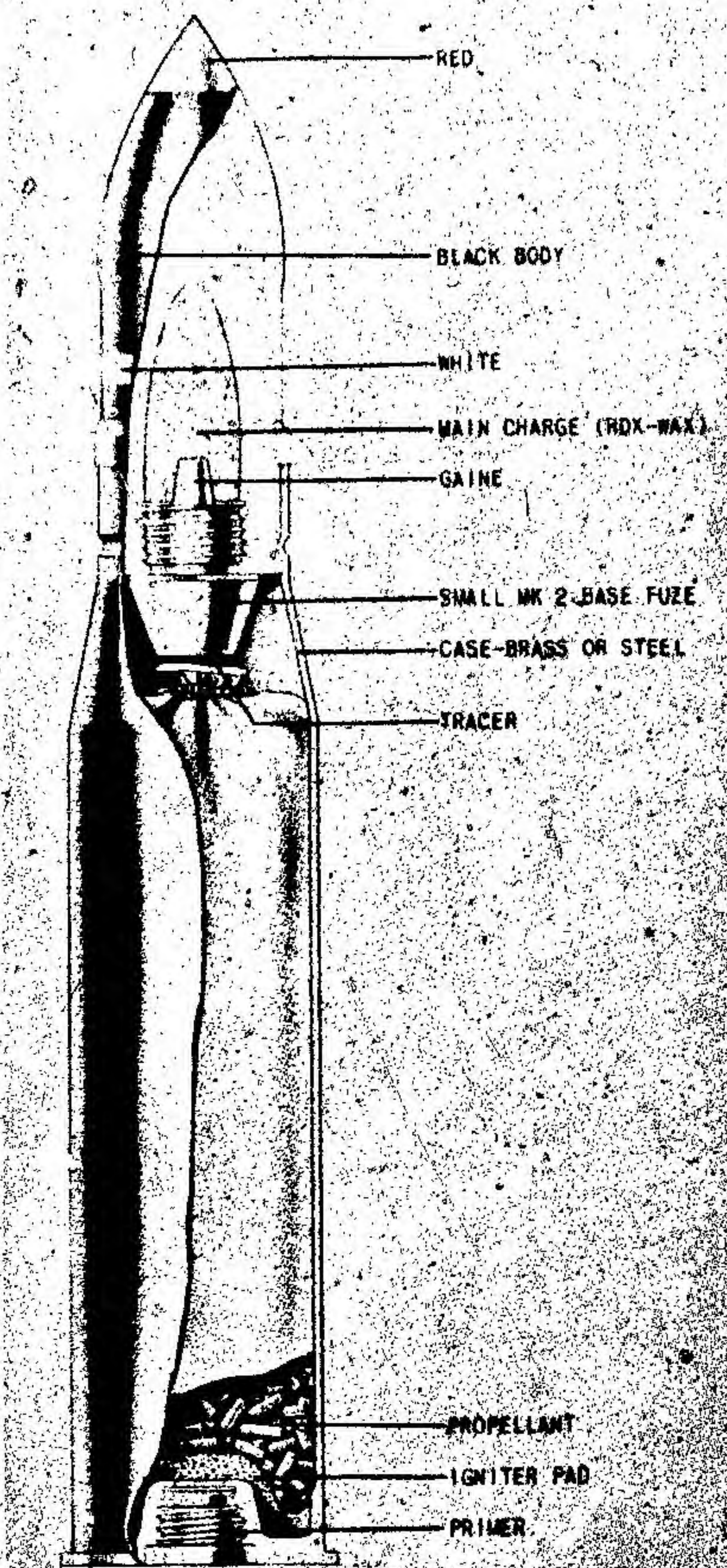


Figure 231—Type 1 47-mm Armor-Piercing Projectile.

Type 1 47-mm Armor-Piercing Projectile

- Weight of complete round: 2.75 kg. (6.1 pounds).
- Weight of projectile, fuze: 1.38 kg. (3.0 pounds).
- Weight of projectile (without fuze): 1.27 kg. (2.8 pounds).
- Weight of filling: 0.018 kg. (0.04 pound).
- Filling: RDX, 90 percent; paraffin, 10 percent.
- Diameter at bourrelet: 47 mm. (minus tol.).
- Length of projectile (without fuze): 143 mm (5½ inches).
- Length of propellant case: 283 mm (11¼ inches).
- Length of assembled round: 398 mm (15½ inches).
- Diameter of base of case: 72 mm (2¾ inches).
- Width of rotating band: 12 mm.
- Weapons in which used: Type 1 antitank gun, type 1 tank gun.
- Fuzing: Small Mk 2 base fuze (short-delay).
- Tracer: Yellow, 5 grams.
- Weight of propellant: 0.398 kg. (0.9 pound).
- Propellant: Single perforated cylindrical grains (¼ inch long, ⅜ inch in diameter) of a graphited double-base powder of the following composition:
 - Nitrocellulose: 60.0 percent.
 - Nitroglycerine: 34.5 percent.
 - Ethyl centralite: 3.0 percent.
 - Diphenyl formamide: 2.5 percent.

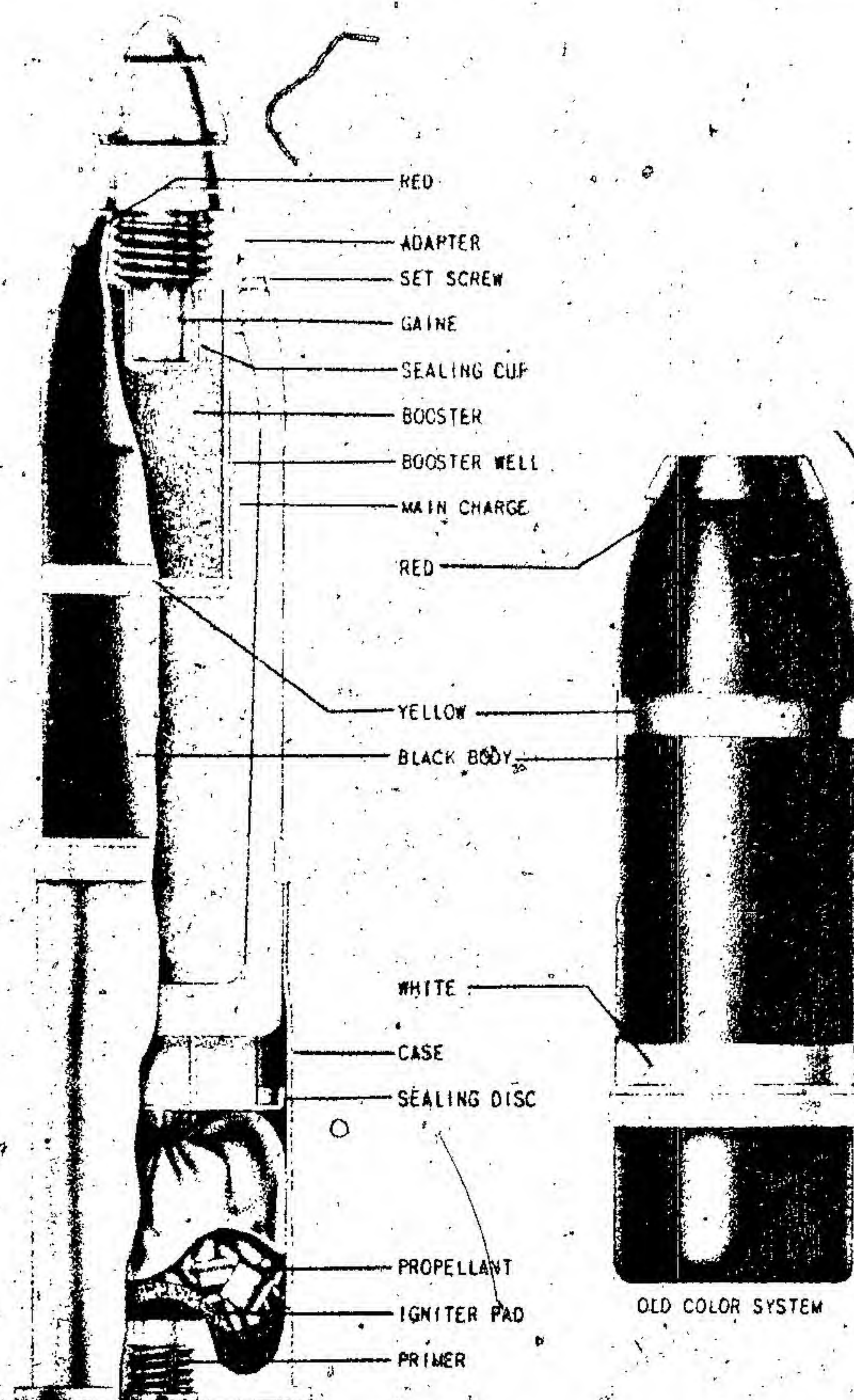


Figure 232—Type 90 5.7-cm High-Explosive Projectile.

Type 90 5.7 cm (57-mm) High-Explosive Projectile

Weight of complete round: 2.91 kg. (6.40 pounds).
 Weight of projectile, filled (fuzed): 2.36 kg (5.18 pounds).
 Weight of filling: 0.25 kg.
 Filling: TNT.
 Diameter at bourrelet: 57 mm (minus tol.).
 Length of projectile (without fuze): 181 mm (7 1/4 inches).

Length of propellant case: 121 mm (4 3/4 inches).
 Length of assembled round (without fuze and adapter): 280 mm (11 inches).
 Width of rotating band: 9.5 mm.
 Weapons in which used: Type 90 tank gun, type 97 tank gun.
 Fuzing: Type 88 short-delay fuze.
 Propellant: Mk 1 square grain (med.), 113 grams.

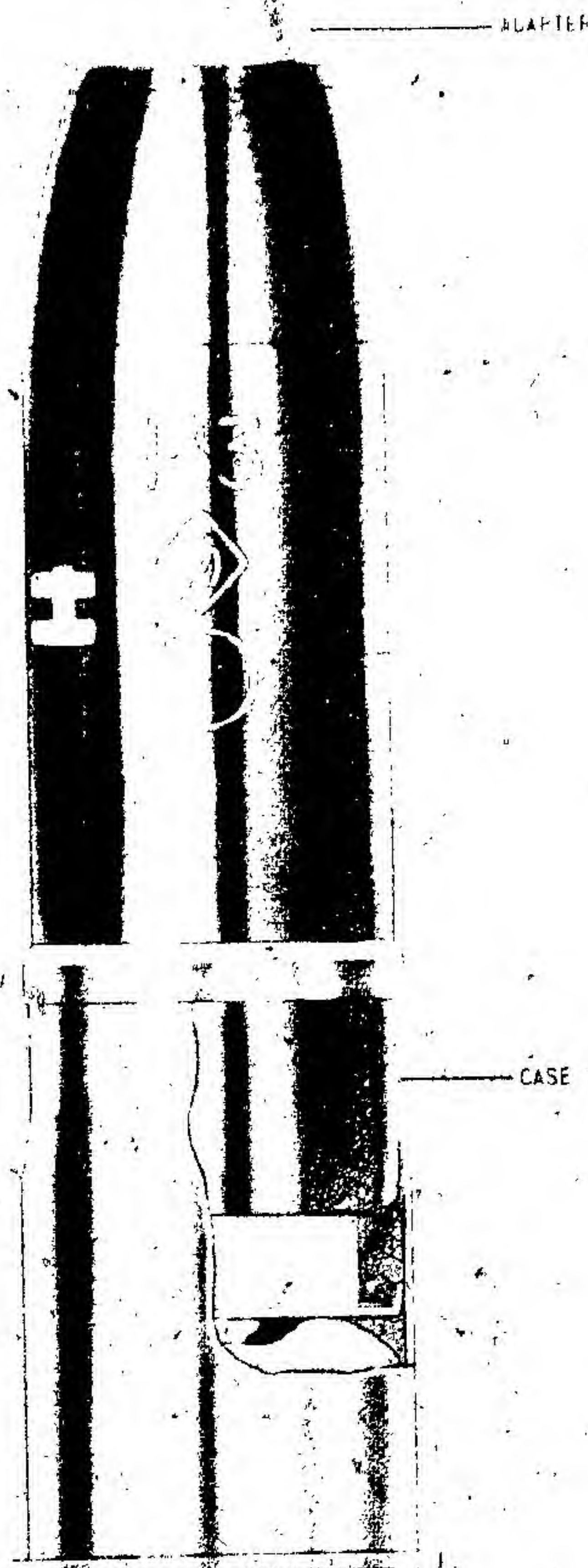


Figure 233—Type 90 5.7-cm Substitute Projectile.

Type 90 5.7-cm (57-mm) Substitute Projectile

Weight of complete round: 3.04 kg. (6.70 pounds).
 Weight of projectile, filled: 2.23 kg. (4.91 pounds).
 Weight of filling: 0.07 kg.
 Filling: Black powder.
 Diameter at bourrelet: 57 mm (2¼ inches).
 Length of projectile (without fuze): 183 mm (7¼ inches).
 Length of propellant case: 121 mm (4¾ inches).

Length of assembled round (without fuze): 272 mm (10 1½ inches).
 Width of rotating band: 9.5 mm.
 Weapons in which used: Type 90 tank gun, type 97 tank gun.
 Fuzing: Type 88 short-delay fuze.
 Propellant: Mk 1 sq. grain (med.), 113 grams.

Remarks: This projectile is made of cast iron and has very thick walls.

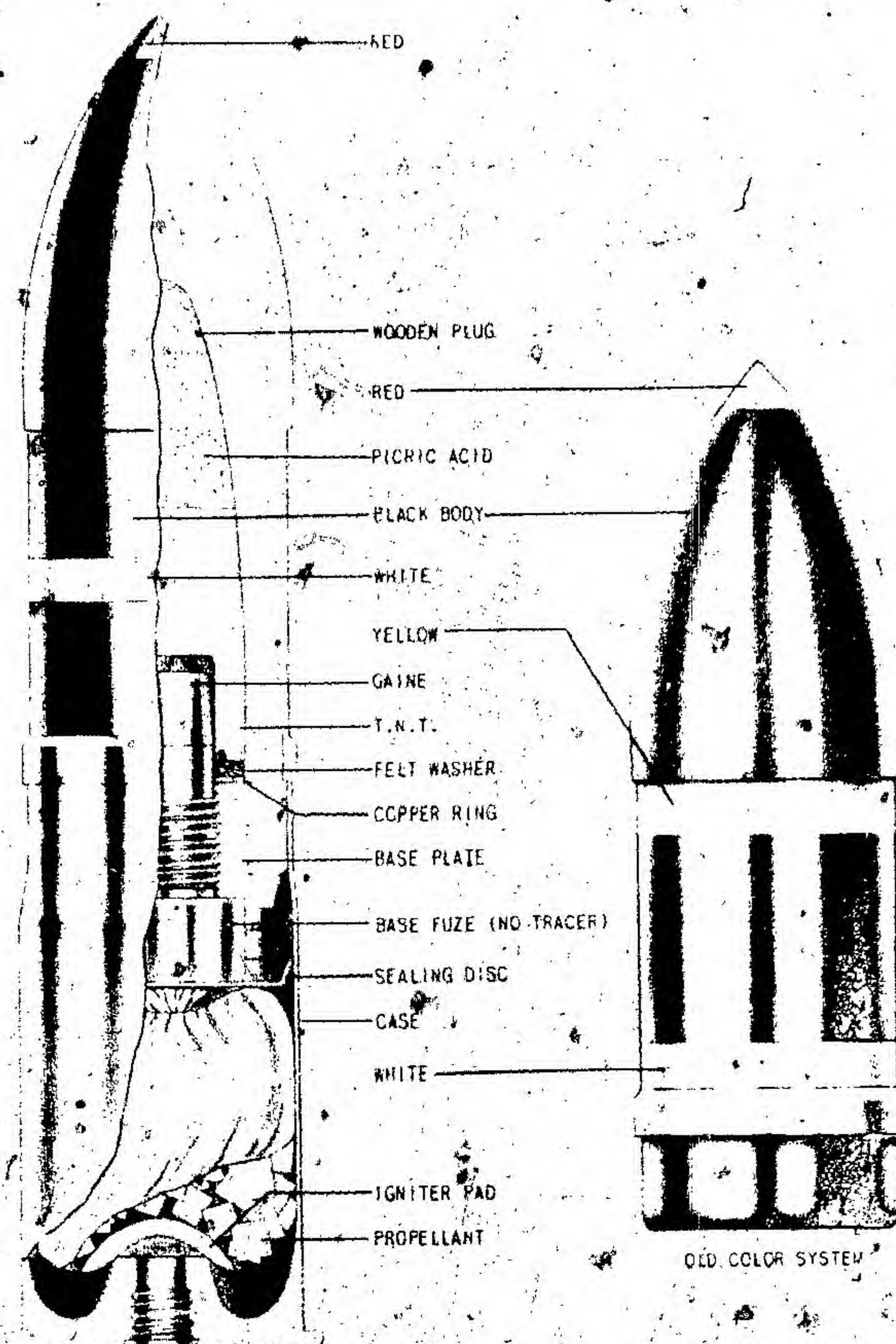


Figure 234—Type 92 5.7-cm Armor-Piercing Projectile.

Type 92 5.7-cm (57-mm) Armor-Piercing Projectile

Weight of complete round: 3.13 kg. (6.89 pounds).
Weight of projectile, filled (fuzed): 2.58 kg. (5.68 pounds).

Weight of filling: 0.10 kg.

Filling: Two sections of explosive, individually wrapped in paper: Upper section, pressed picric acid and wax; lower section, cast TNT.

Diameter at bourrelet: 57 mm (minus tol.).

Length of projectile (without fuze adapter): 181 mm (7 1/4 inches).

Length of propellant case: 121 mm (4 3/4 inches).

Length of assembled round: 280 mm (11 1/4 inches).

Width of rotating band: 10 mm.

Weapons in which used: Type 90 tank gun, type 97 tank gun.

Fuzing: Type 92 small base fuze.

Propellant: Mk 1 sq. grain (med.), 113 grams.

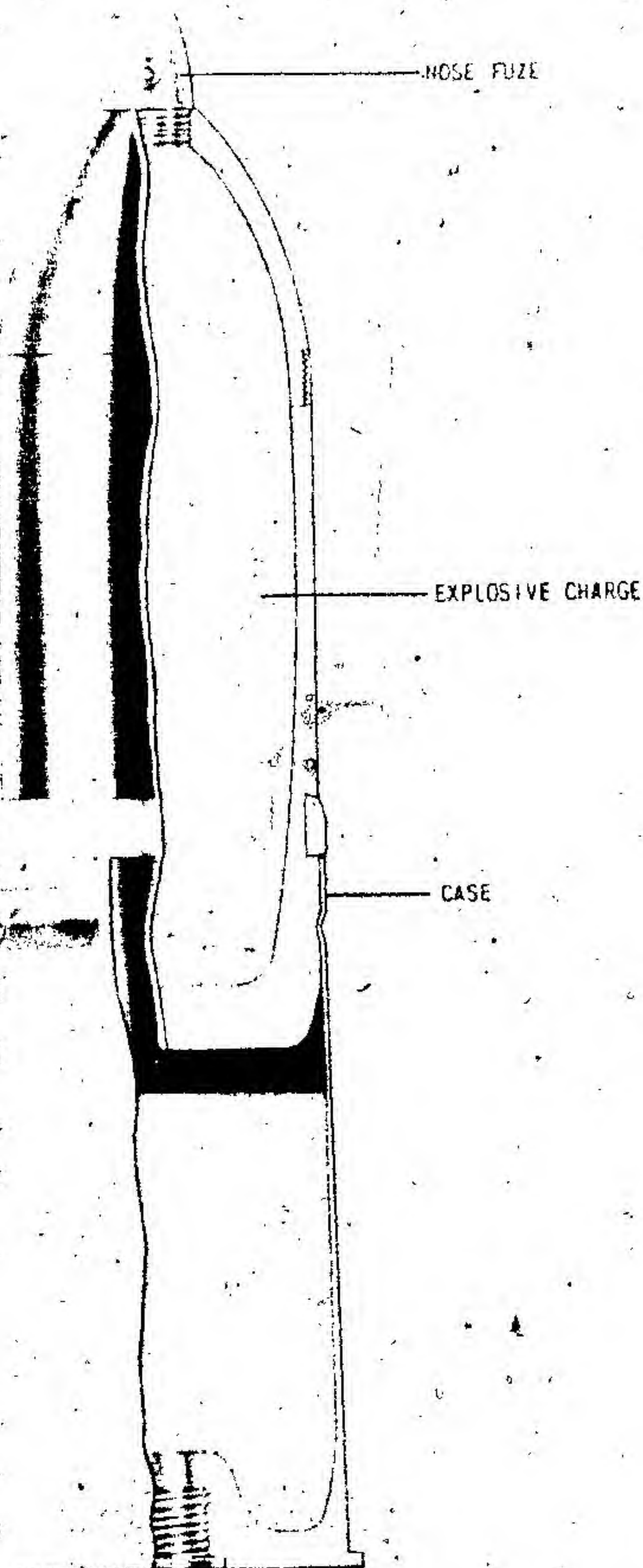


Figure 235—57-mm HO-401 High-Explosive Projectile.

57-mm Ho-401 High-Explosive Projectile

Weight of complete round: 2.15 kg. (4.75 pounds).
 Weight of projectile, filled (fuzed): 2.58 kg. (3.25 pounds).
 Weight of filling: No data.
 Filling: No data.
 Diameter at bourrelet: 57 mm (2¼ inches).

Length of projectile (without fuze): 163 mm (6³/₁₆ inches).
 Length of propellant case: 121 mm (4¾ inches).
 Length of assembled round: 270 mm (10¾ inches).
 Width of rotating band: 11 mm.
 Weapons in which used: Ho-401 aircraft cannon.
 Fuzing: No data.
 Propellant: No data.

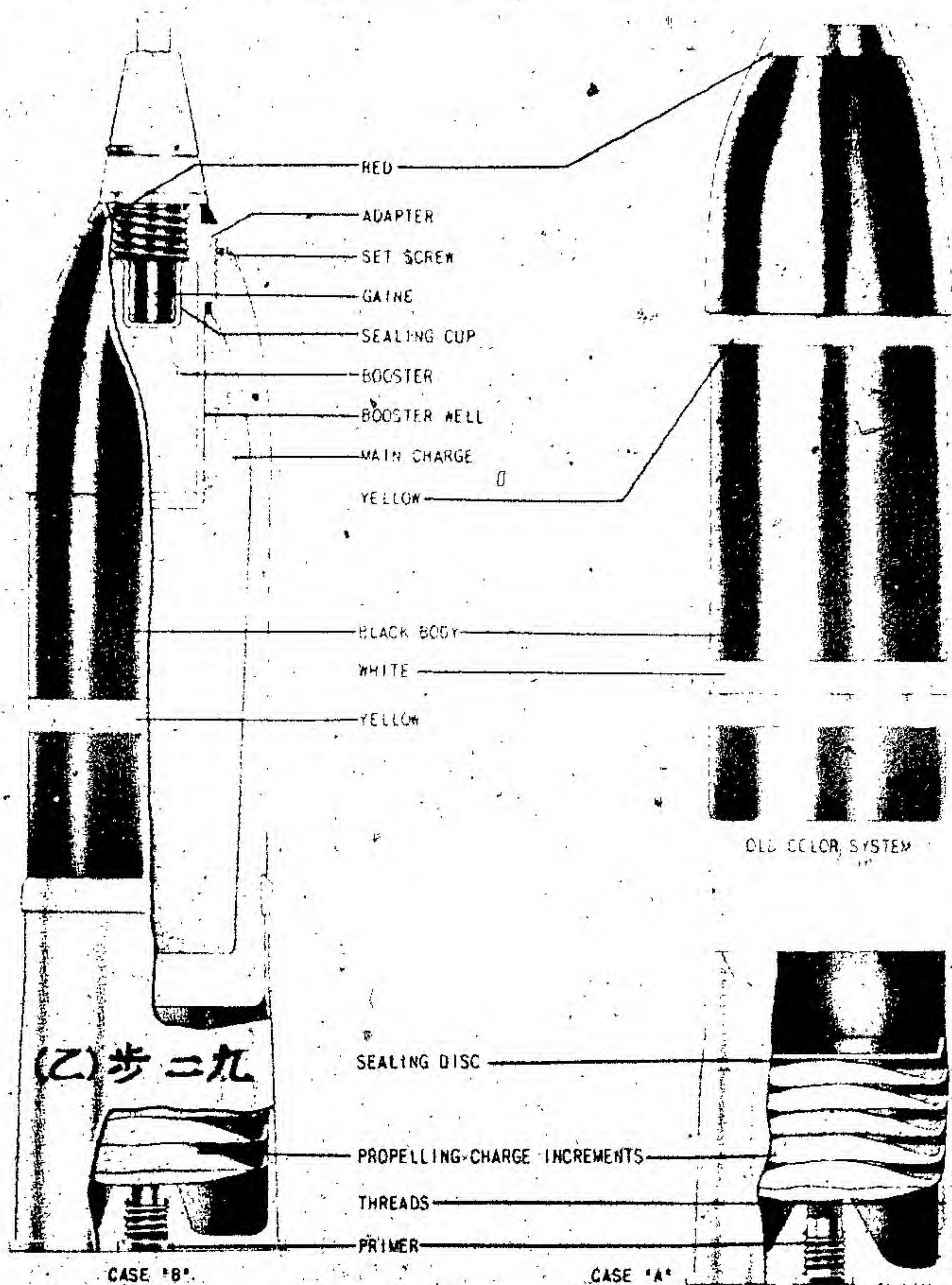


Figure 236—Type 92 7-cm High-Explosive Projectile.

Type 92 7-cm (70-mm) High-Explosive Projectile

Weight of complete round: 4.48 kg. (9.90 pounds).

Weight of projectile fuze: 3.81 kg. (8.38 pounds).

Weight of filling: 0.59 kg.

Filling:

Standard, cast TNT.

Alternate, pressed mixture of RDX and ammonium nitrate.

Diameter at bourrelet: 70 mm (minus tol.).

Length of projectile (without fuze): 234 (9 1/4 inches).

Length of propellant case: 101 mm (4 inches).

Length of assembled round (without fuze): 306 mm (12 1/8 inches).

Diameter of base of case: 81 mm ($3\frac{1}{8}$ inches).
 Width of rotating band: 10 mm.
 Weapons in which used: Type 92 infantry gun (howitzer).

Fuzing:

Type 88 instantaneous nose fuze (howitzer, mortar type).

Type 88 short-delay nose fuze (howitzer, mortar type).

Propellant: 50 grams of smokeless powder in 0.5 mm square flakes. This powder is contained in four pads made by sewing portions of the powder between two dark blue silk discs. The discs are not of uniform size, holding 5.4, 8.9, 16.8, and 18.7 grams of powder each. A fifth disc, light blue in color, contains a 3.1 gram black powder ignition charge.

The propellant cases are of two designs. The newer type, designated "B" (OTSU) by the Japanese, is one piece and slips off of the projectile to change the propellant charge. An older design, presumably "A" has a threaded base which may be unscrewed to vary the charge.

Remarks: This projectile is the same as the high-explosive, type 92, used in the type 94 tank gun.

Type 92 7-cm (70-mm) Substitute Projectile

Weight of complete round: No data.

Weight of projectile fuzed: No data.

Weight of filling: No data.

Filling: Black powder.

Diameter at bourrelet: 70 mm (minus tol.).

Length of projectile (without fuze): 187 mm ($7\frac{3}{8}$ inches).

Length of propellant case: 101 mm (4 inches).

Length of assembled round (without fuze): 259 mm ($10\frac{1}{8}$ inches).

Diameter of base of case: 81 mm ($3\frac{1}{8}$ inches).

Width of rotating band: 10 mm.

Weapons in which used: Type 92 infantry gun (Howitzer).

Fuzing:

Type 88 instantaneous nose fuze (howitzer, mortar type).

Type 88 short-delay nose fuze (howitzer, mortar type).

Propellant: Refer to the type 92 high-explosive projectile.

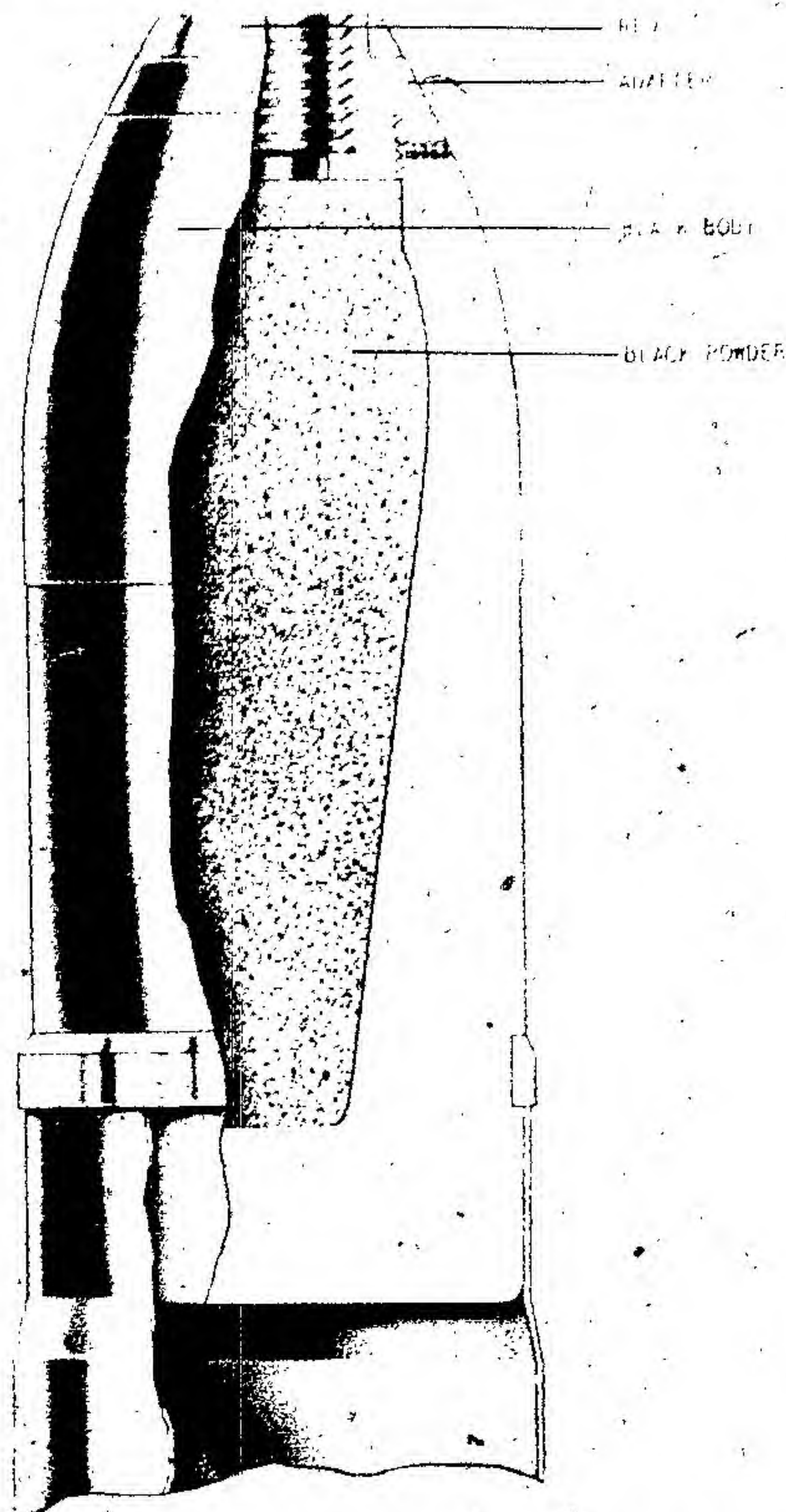


Figure 237—Type 92 7-cm Substitute Projectile.

Type 37-cm (70-mm) Hollow-Charge Projectile

Weight of complete round: No data.

Weight of projectile (without fuze): (2.80 kg.) 6 pounds, 4.75 ounces.

Weight of filling: (0.99 kg.) 1 pound.

Filling: A cast mixture of TNT and Cyclonite (RDX) wrapped in varnished paper.

Diameter at bourrelet: 69.5 mm ($2\frac{5}{8}$ inches).

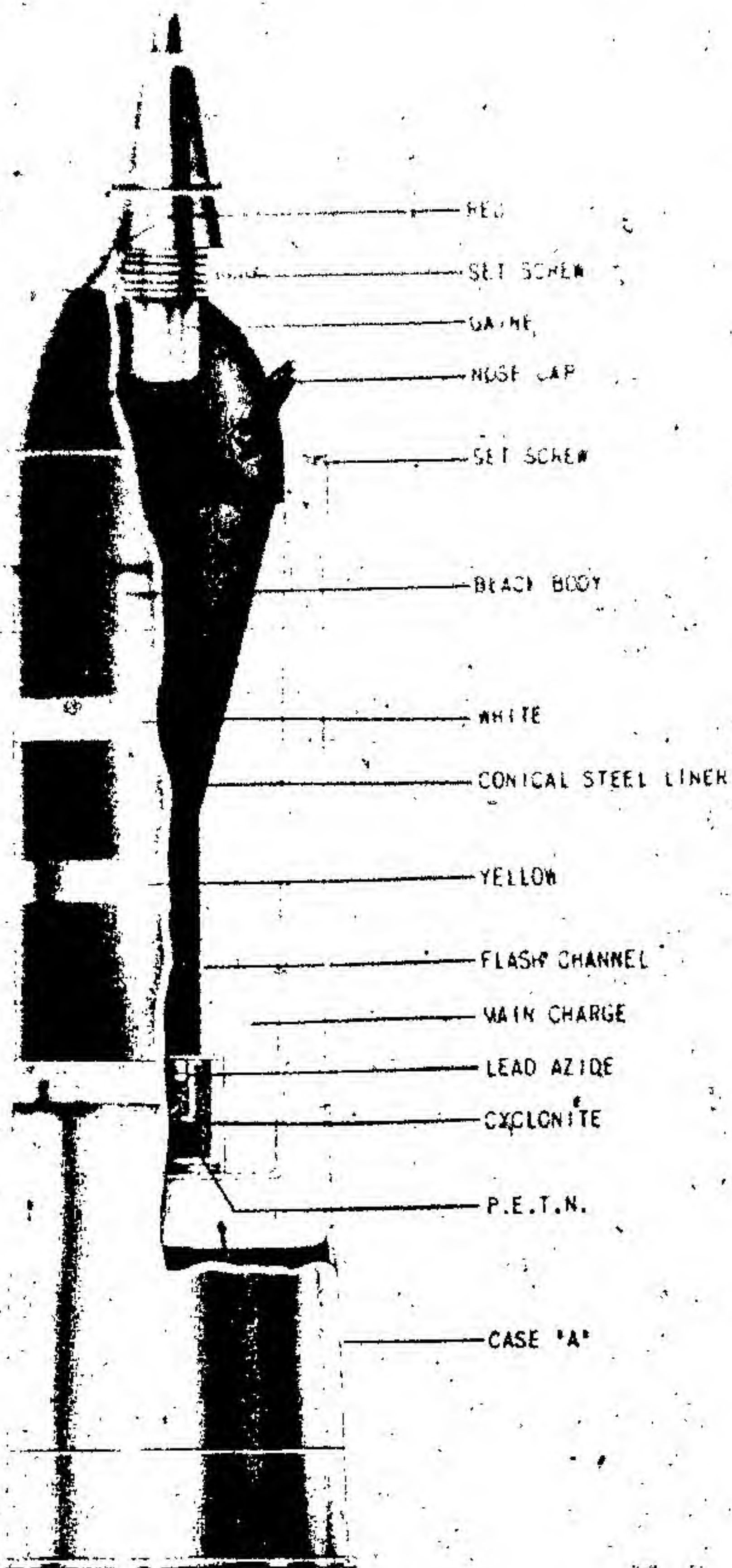


Figure 238—Type 3 7-cm Hollow-Charge Projectile.

Length over all (without fuze): 229 mm (9 inches).
 Length protruding from case: 186 mm (7 $\frac{1}{4}$ inches).
 Length of projectile body without nose cap: 170 mm (6 $\frac{3}{4}$ inches).
 Width of rotating band: 10 mm.
 Weapons in which used: Type 92 infantry gun (howitzer).
 Fuzing: Type 88 instantaneous fuze (howitzer, mortar type). Operation and Employment: This round is used principally as an anti-tank weapon.

Remarks: The use of a white band above a yellow band to identify hollow charge projectiles is assumed to be a combination of the use of white band for armor-piercing and yellow band for high explosive in the new color system. Both bands are near the middle of the projectile.

This arrangement is not to be confused with the combination of yellow band above white band to identify high explosive projectiles in the old color system, in which case the yellow band is at the bourrelet and the white band just above the rotating band.

Type 95 7-cm (70-mm) Illuminating Projectile

Weight of complete round: 4.20 kg. (9.24 pounds).
 Weight of projectile, fuzed: 3.50 kg. (7.70 pounds).
 Weight of filling: No data.
 Filling:

Ejection charge: Black powder.

Illuminating composition: Not known. It is probably a mixture of magnesium, aluminum, and barium nitrate which is used commonly by the Japanese for illuminating charges.

Diameter at bourrelet: 70 mm (minus tol.).
 Length of projectile (without fuze): No data.
 Length of propellant case: 101 mm (4 inches).
 Length of assembled round (without fuze): 292 mm (11 $\frac{1}{2}$ inches).
 Diameter of base of case: 81 mm (3 $\frac{1}{4}$ inches).
 Width of rotating band: No data.
 Weapons in which used: Type 92 infantry gun (howitzer).
 Fuzing: Type 89 small time fuze.

Propellant: 0.6-mm square flakes (50 grams). Either of the propellant cases discussed for the H. E. round may be used for this round.

Remarks: The illuminating charge burns for approximately 20 seconds with an intensity of about 90,000 candlepower.

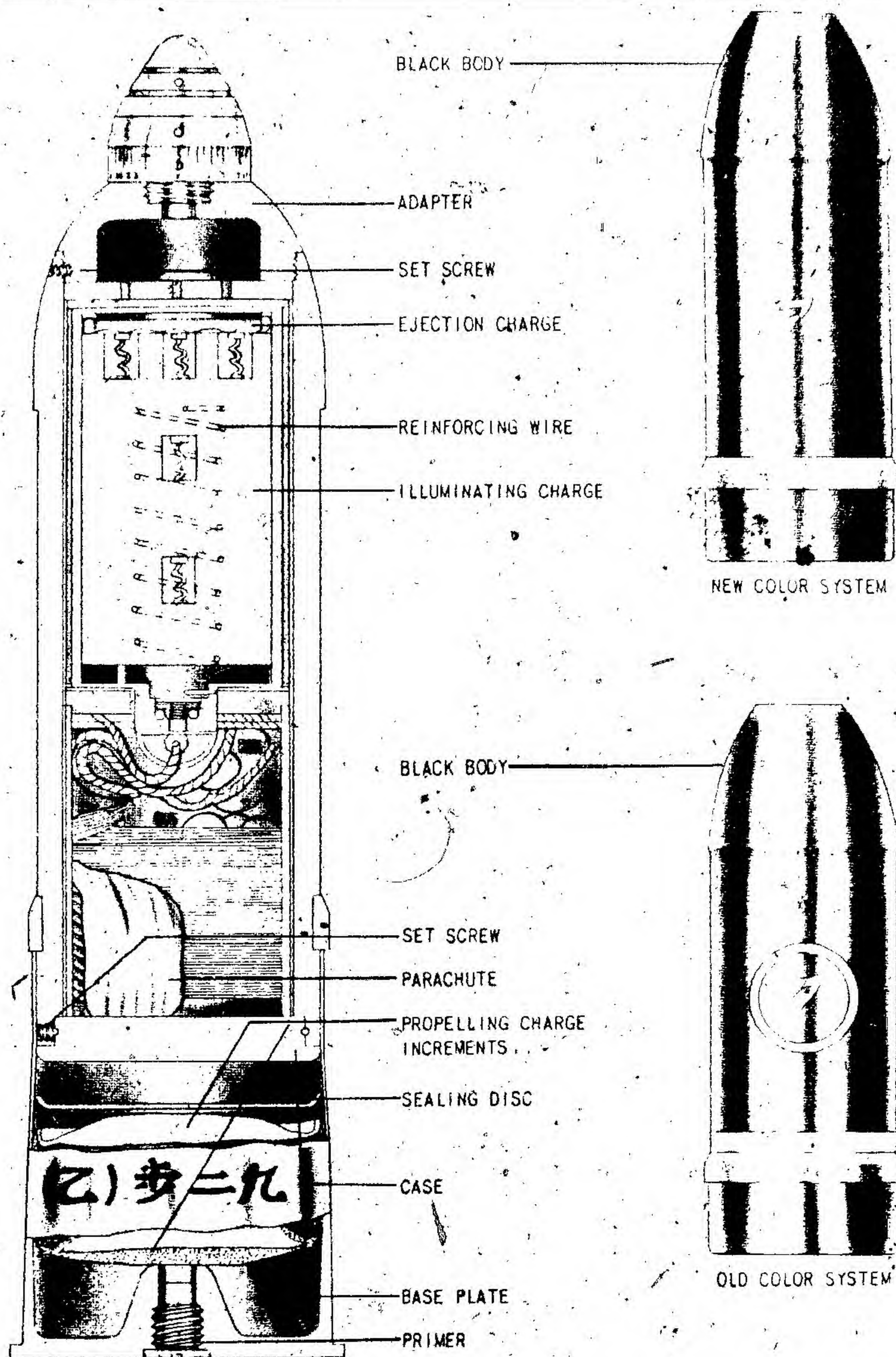


Figure 239—Type 95 7-cm Illuminating Projectile.

JAPANESE EXPLOSIVE ORDNANCE

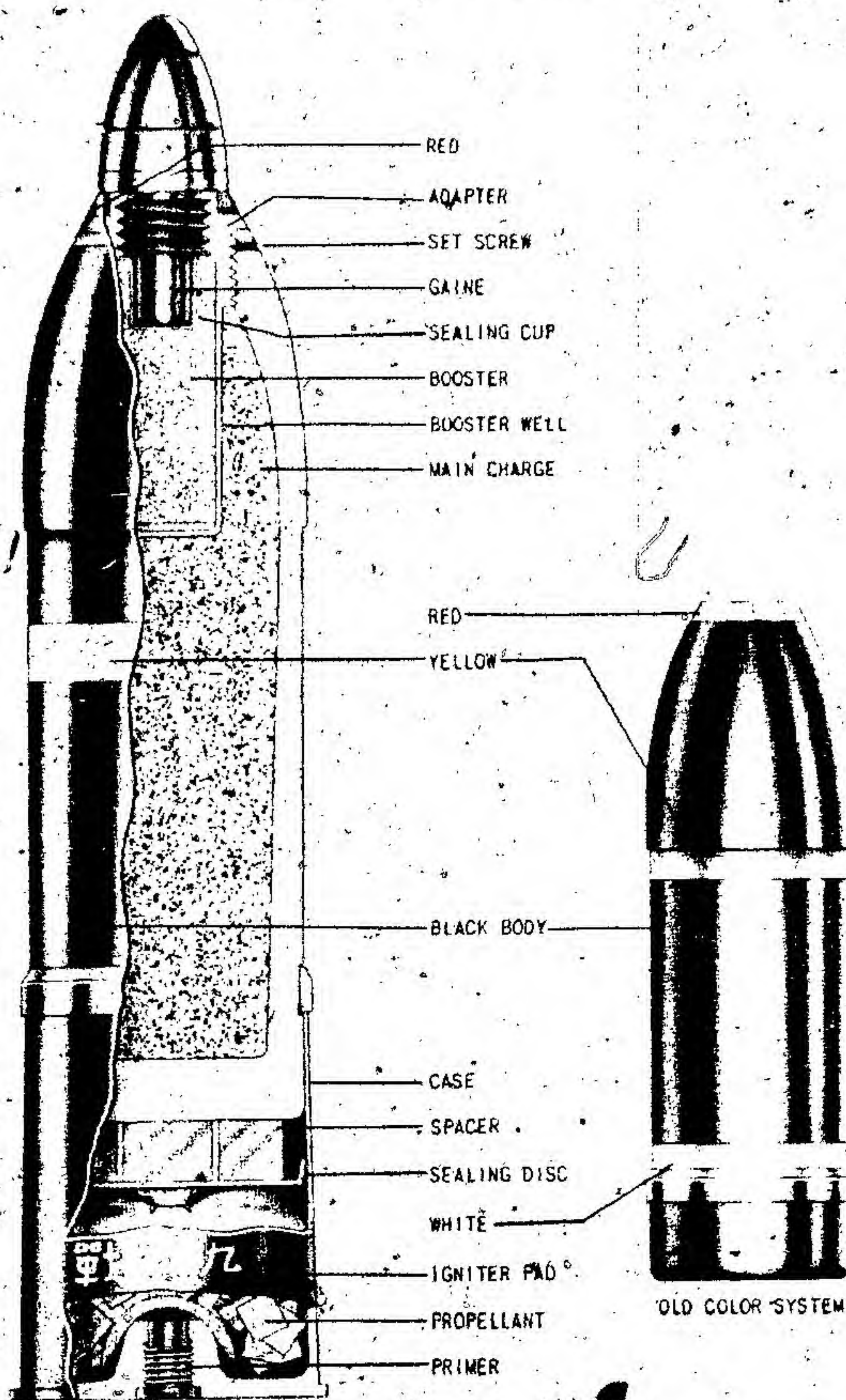


Figure 240—Type 92 7-cm High-Explosive Projectile.

Type 92 7-cm (70-mm) High-Explosive Projectile

Weight of complete round: 4.42 kg. (9.72 pounds).
 Weight of projectile fuze: 3.81 kg. (8.38 pounds).
 Weight of filling: 0.590 kg.
 Filling: Standard, cast TNT; alternate, pressed mixture of R. D. X. and ammonium nitrate.
 Diameter at bourrelet: 70 mm (minus tol.).
 Length of projectile (without fuze): 234 mm (9 1/4 inches).
 Length of propellant case: 101 mm (4 inches).

Length of assembled round (without fuze): 306 mm (12 1/8 inches).
 Diameter of base of case: 81 mm (3 1/8 inches).
 Width of rotating band: 10 mm.
 Weapons in which used: Type 94 tank gun.
 Fuzing: Type 88 short-delay nose fuze (gun type).
 Propellant: 138 grams of 5-mm square grain (medium) smokeless powder.

Remarks: The projectile is the same as the type 92 H. E. projectile used in the Type 92 Infantry Howitzer.

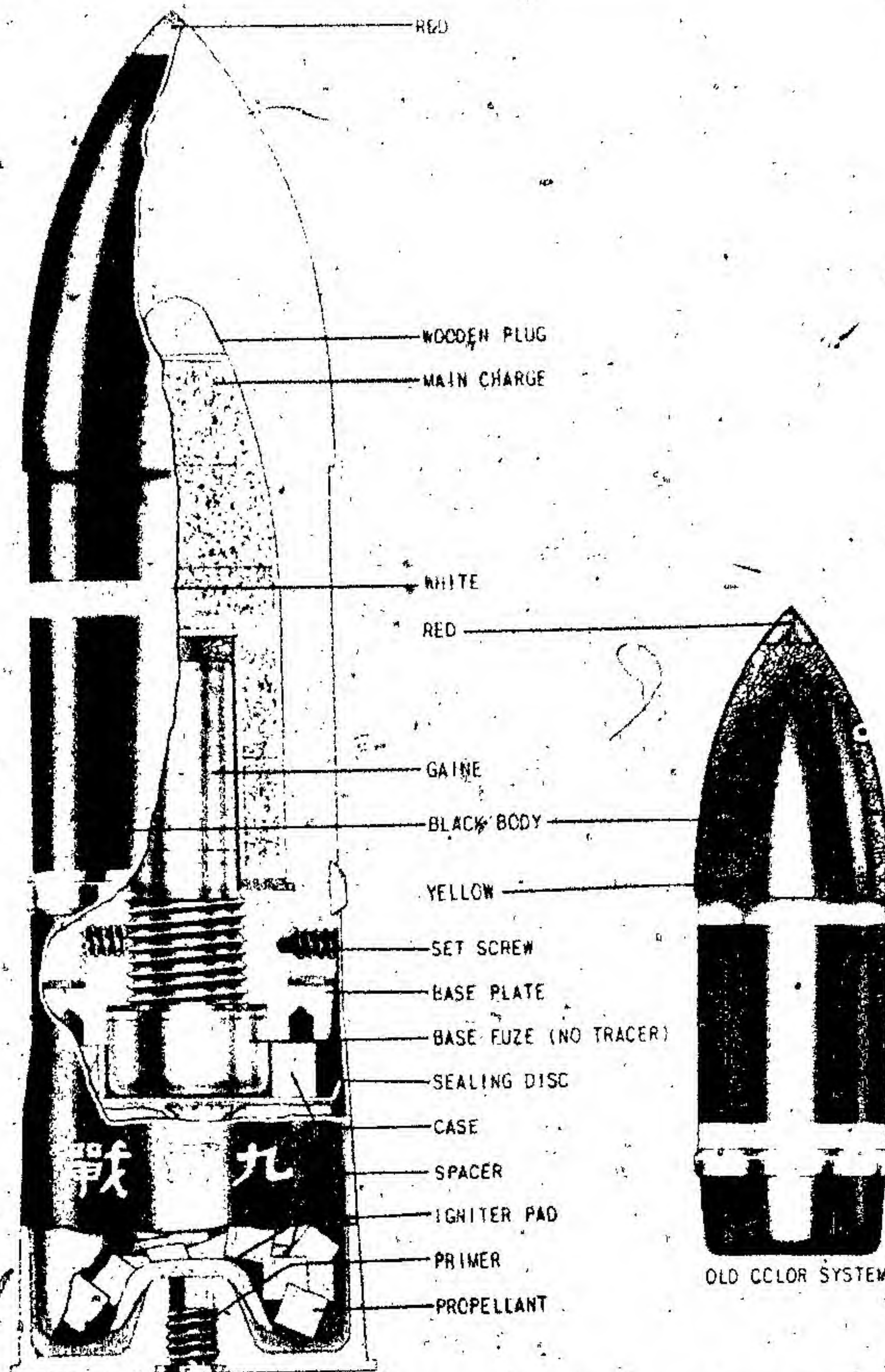


Figure 241—Type 95 7-cm Armor-Piercing Projectile.

Type 95 7-cm (70-mm) Armor-Piercing Projectile

Weight of complete round: 5.04 kg. (11.10 pounds).

Weight of projectile, fuzed: 4.45 kg. (9.80 pounds).

Weight of filling: 0.170 kg.

Filling: Preformed, paper-wrapped filling: Forward portion, "OSHIYAKU" (Picric Acid, 90 percent; paraffin, 10 percent; after portion, TNT).

Diameter at bourrelet: 70 mm (minus tol.).

Length of propellant case: 101 mm (4 inches).

Length of assembled round: 307 mm (12 1/8 inches).

Diameter of base of case: 81 mm (3 1/8 inches).

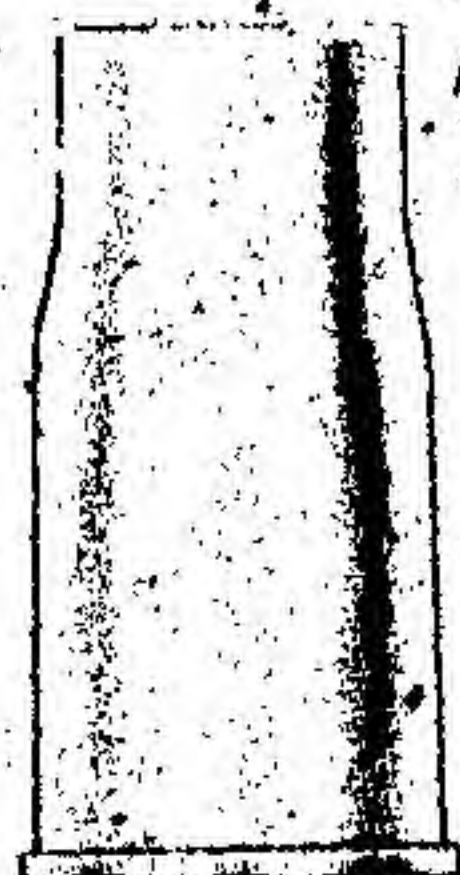
Width of rotating band: 10 mm.

Weapons in which used: Type 94 tank gun.

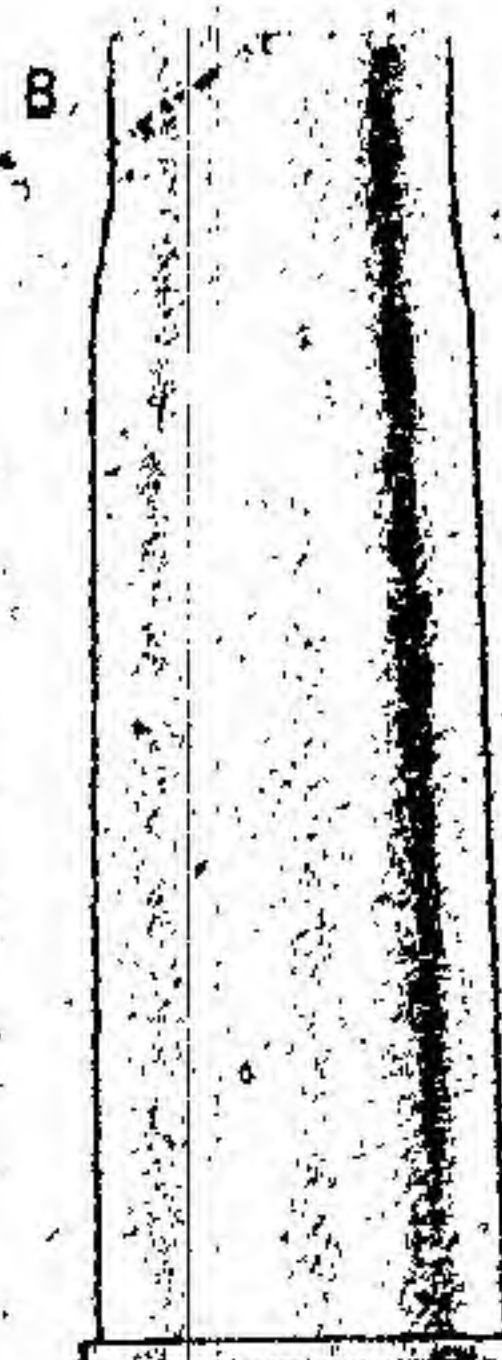
Fuzing: Type 95 small A. P. base fuze.

Propellant: 5 mm square grain (medium) 120 grams.

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LGTH.: 184 MM. (7 1/4")



LGTH.: 294 MM. (11-9/16")



LGTH.: 424.4 MM. (16-11/16")



LGTH.: 497 MM. (19-9/16")

Figure 242—7-cm Introduction.

INTRODUCTION TO ARMY 7-cm (75-mm) AMMUNITION

There were ten or more 75-mm guns in use in the Japanese Army. Though the weapons vary considerably in design, length of bore, and employment, the bore diameter (75 mm) is held constant and in large part the projectiles are designed to be interchangeable for numerous guns. In this way, identical projectiles may be assembled with different sizes of case and propellant charge to fit the various weapons.

For this reason the cases and propellant charges for the different weapons will be treated separately and the projectiles will be presented as a group of designs which are potentially interchangeable for all Army 75-mm guns. The specific purpose of a given projectile or a given gun will limit the occurrence of many of the possible combinations.

Ammunition for Japanese Navy guns designated "8 cm" is comparable in size to Army 7-cm, but the Navy guns have a bore diameter of three inches (76.2 mm) and Army and Navy projectiles and ammunition are not interchangeable. Navy guns as well as Army guns are found commonly in shore defenses, but the identity of the installations, weapons, and ammunition remains distinctly Army or Navy.

CLASSIFICATION OF JAPANESE ARMY 75-MM GUNS BY SIZE OF CHAMBER (SIZE OF PROPELLANT CASE)

Size of case	Weapon	Marking on case
A	Type 41 mountain gun (regimental gun) --	四 一 山 (Rare) Written vertically
	Type 94 mountain gun --	九 四 山 Written vertically
B	Type 38 field gun --	九 改 四 三
	Type 41 cavalry gun --	造
	Type 38 improved field --	五 三 一 八
	Type 95 field gun --	八
C	Type 11 year field/A. A. gun --	野 野 騎 野
	Type 90 field gun --	九 〇
	Type 1 self-propelled gun --	
D	Type 88 field/A. A. gun --	ハハ式七高
	Type 88 field/A. A. gun (special) --	ハハ式七高 (持) Written vertically

*For convenience in reference, this group, in which the propellant case bears the multiple designation for four weapons, will be termed "Type 38 Field Gun Group."

JAPANESE EXPLOSIVE ORDNANCE

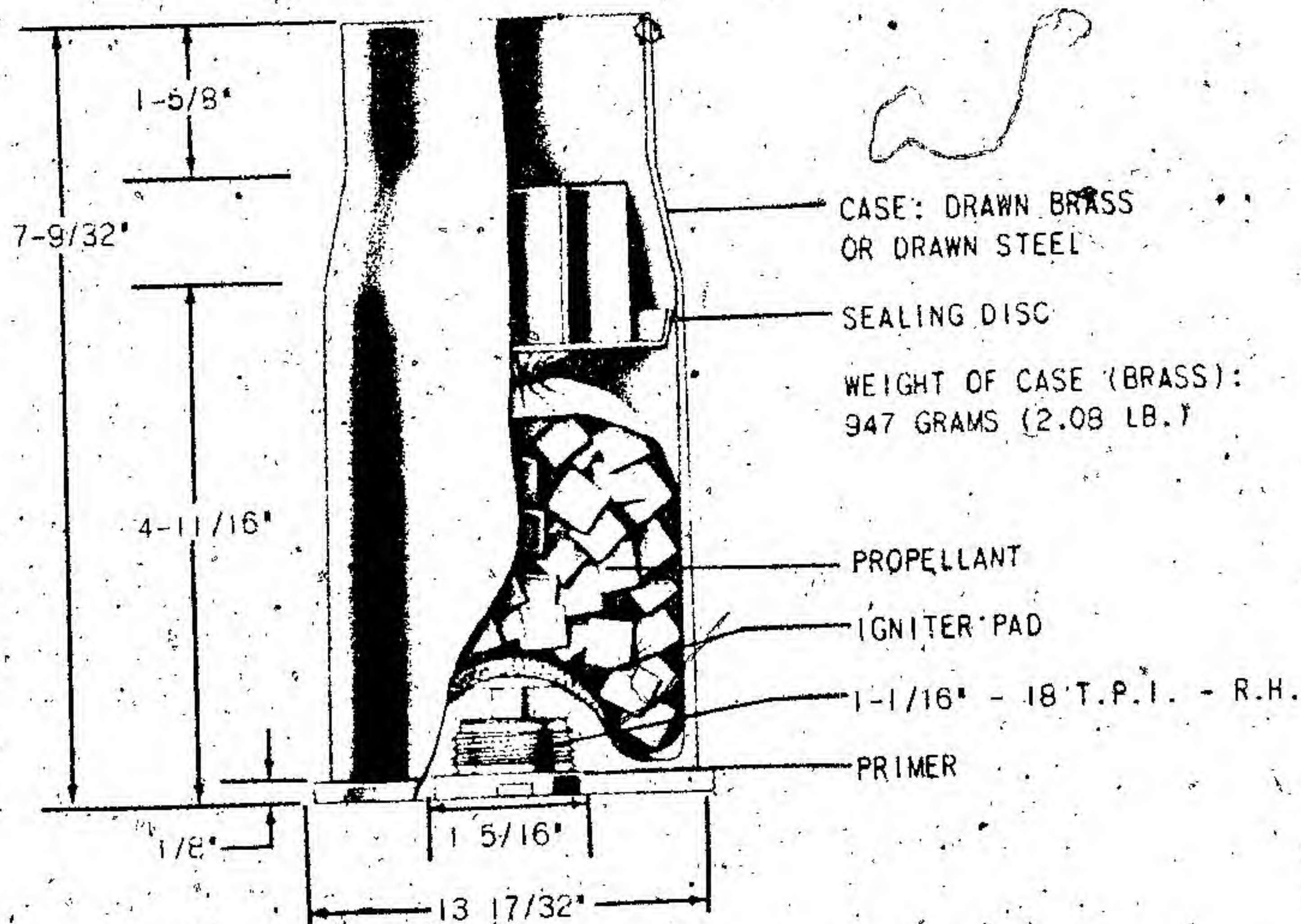
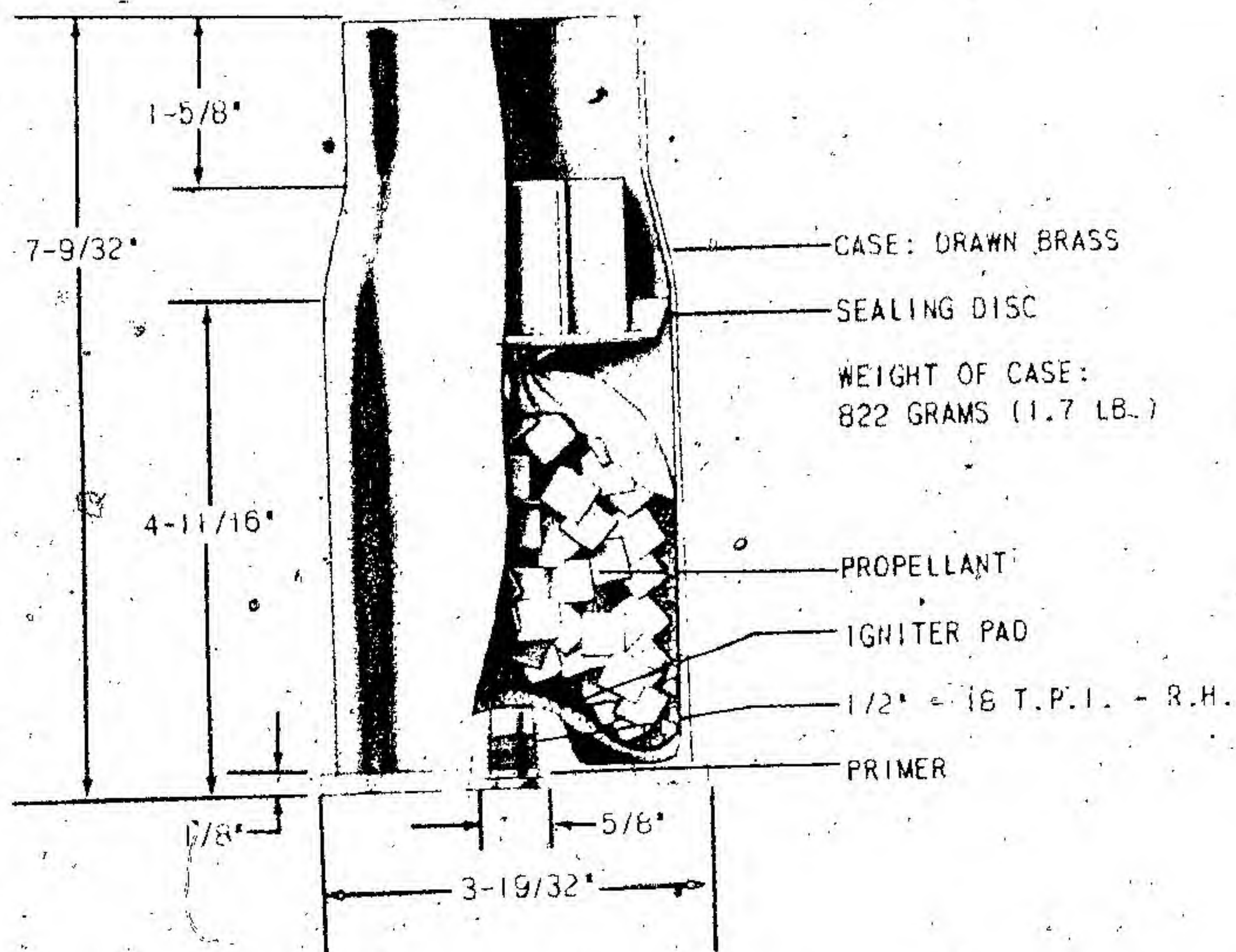


Figure 243—7-cm Propellant Cases.

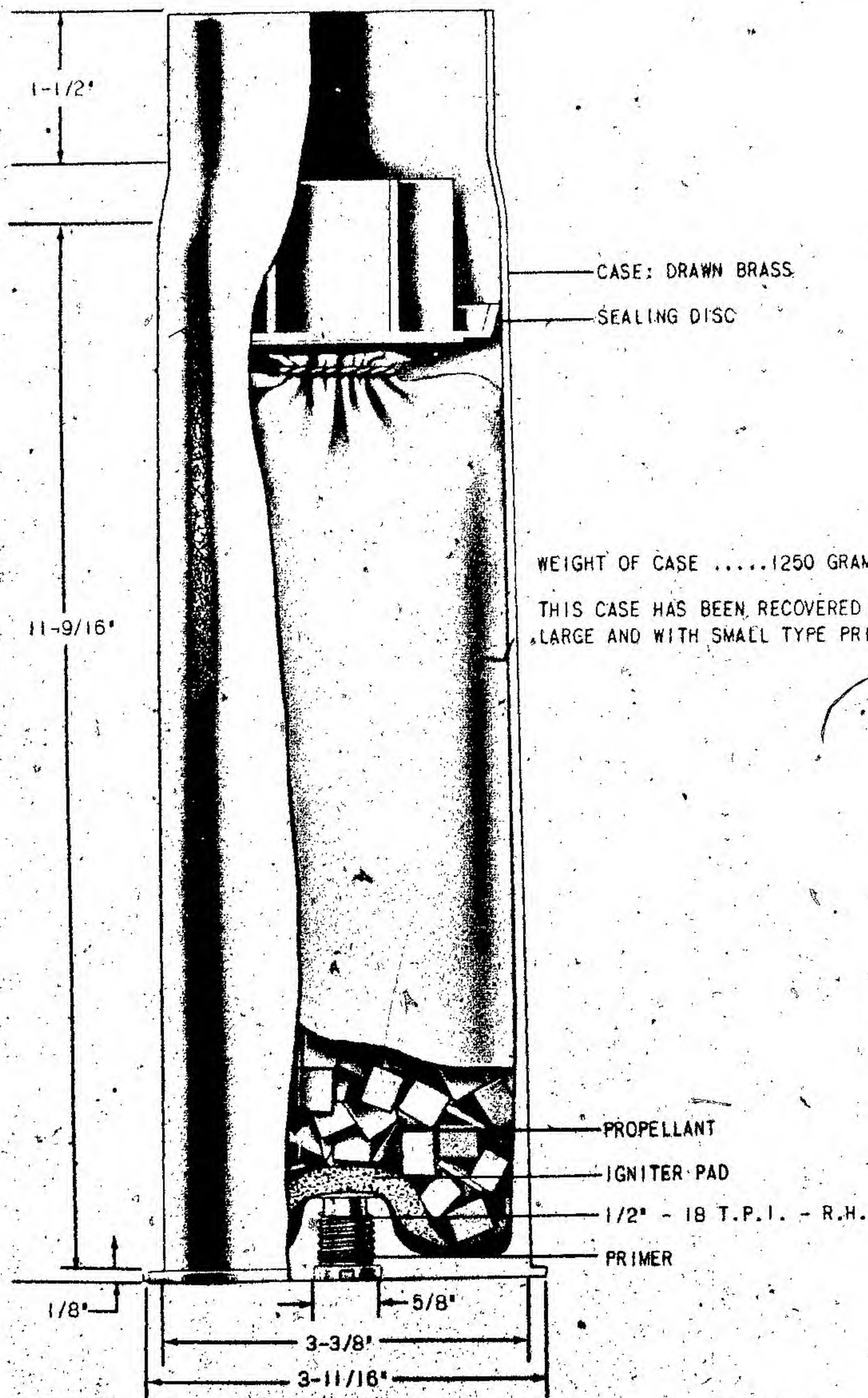


Figure 244—7-cm Propellant Case.

JAPANESE EXPLOSIVE ORDNANCE

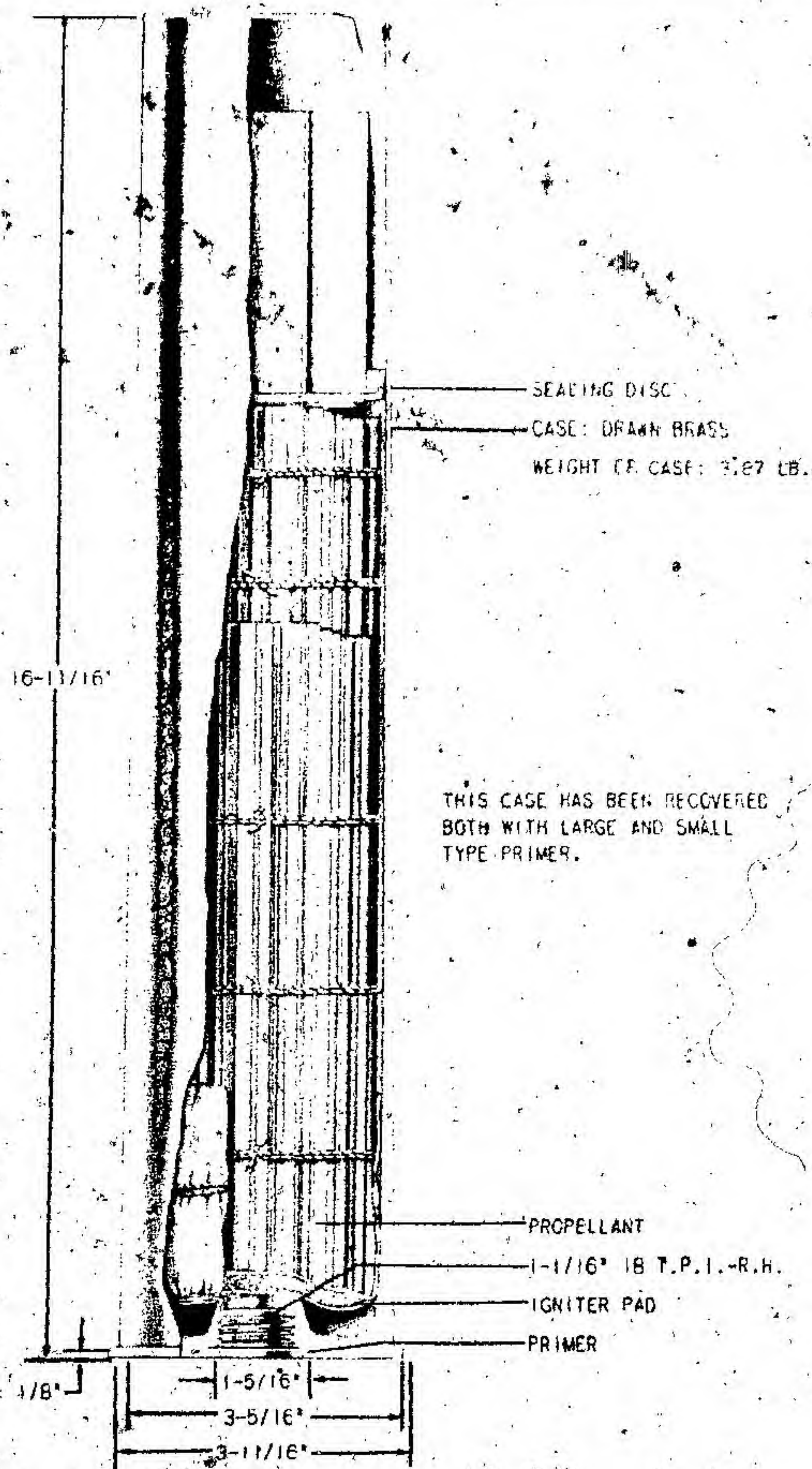


Figure 245—7-cm Propellant Case.

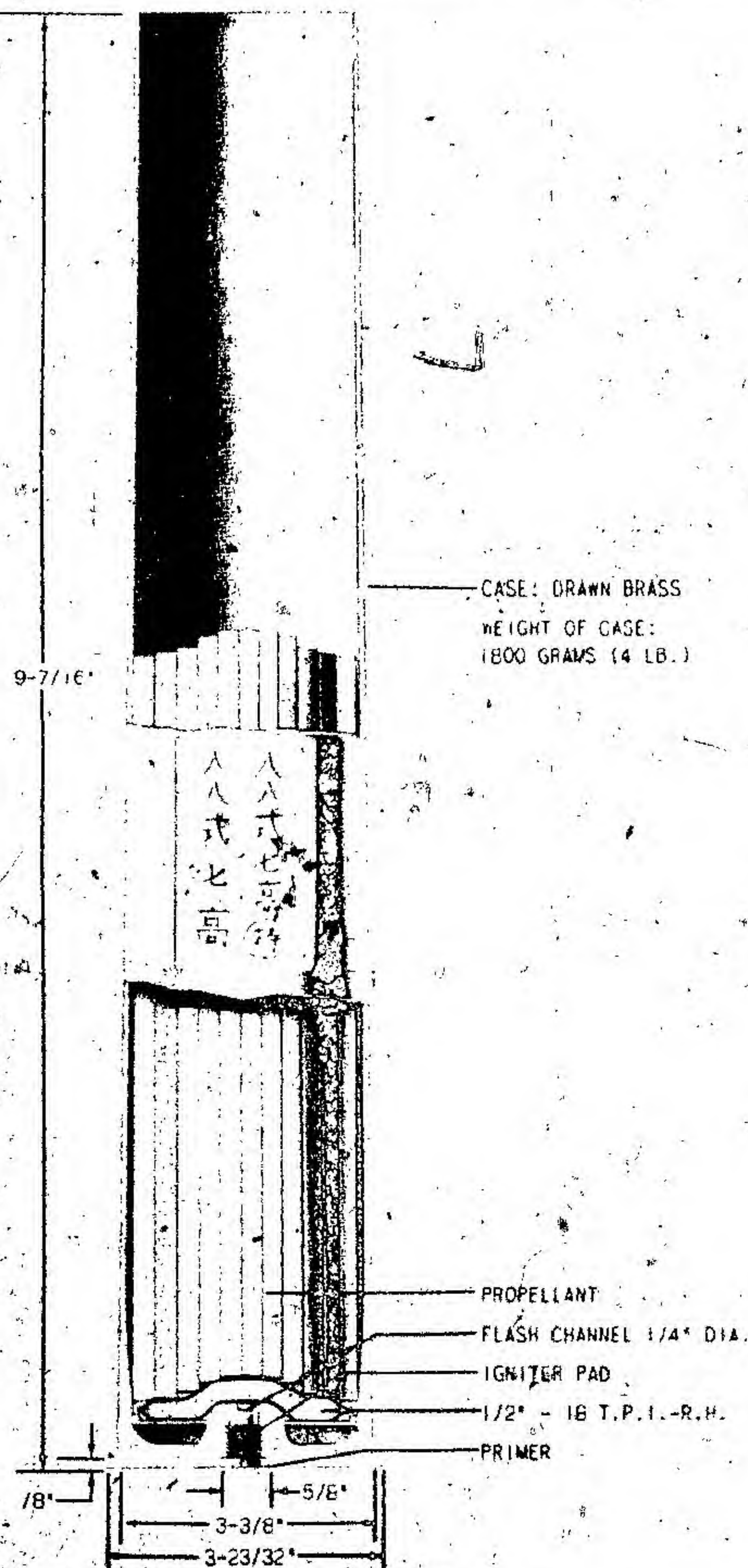


Figure 246—7-cm Propellant Case.

JAPANESE EXPLOSIVE ORDNANCE

ARMY 7-CM (75-MM) COMPLETE ROUNDS

Projectile	Propellant charge used for various guns						
	Type 41 mountain	Type 94 mountain	Type 38 group	Type 90 field	Type 88 field-AA	Type 88 special	Type 11 year field-AA
H. E. A. A. (?)							Mk 1 Flat Strip 600 g.
H. E. A. A. (L. P.) Type 90.					(Sing. perf. cyl. sticks 1474 g.)	Mk 3 Flat Strip 390 g.	Mk 1 Flat Strip 600 g.
H. E. (L. P.) Type 90		No data	Mk 1 Flat Strip 600 g.	Mk 3 Med. Flat Strip 200 g.		Mk 2 Flat Strip 260 g.	
H. E. Type 94	Mk 1 Sq. Grain 265 g.	Sq. Grain 492 g.	Mk 1 Flat Strip 600 g.	Mk 1 Flat Strip 655 g.		Mk 1 Flat Strip 675 g.	
H. E. Design "A"	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Flat Strip 600 g.				
H. E. Design "B"	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Flat Strip 600 g.				
H. E. (conv't'd) Type 98 (Modif).	No data		No data				
H. E. Semi-St. Type 90	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Flat Strip 600 g.	No data			
H. E. Semi-St. Type Undet.	Mk 1 Sq. Grain 265 g.	No data					
Hollow Charge Type 2	(Sq. Grain 227 g.)	No data					
A. P. H. E. Type 95	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Flat Strip 600 g.	No data			
A. P. Type Undet.	Mk 1 Sq. Grain 265 g.	No data					
Shrapnel Type 38	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Flat Strip 600 g.	Mk 1 Flat Strip 655 g.		No data	

ARMY 7-CM (75-MM) COMPLETE ROUNDS—Continued

Projectile	Propellant charge used for various guns						
	Type 41 mountain	Type 94 mountain	Type 38 group	Type 90 field	Type 88 field-AA	Type 88 special	Type 11 year field-AA
Shrapnel Type 90	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Flat Strip 600 g.	Mk 1 Flat Strip 655 g.			
Smoke (W. P.) Type Undet.							
Smoke (W. P.) Type 90	Mk 1 Sq. Grain 265 g.	(Sq. Grain 320 g.)	Mk 1 Flat Strip 600 g.	Mk 1 Flat Strip 655 g.			
Incendiary (Non-liquid) Type 90.	No data	No data	No data	No data			
Illuminating Type 90	Mk 1 Sq. Grain 265 g.	No data	Mk 1 Med. Flat Strip 410 g.	Mk 1 Med. Flat Strip 435 g.		No data	
Target Type 11 Yr (?)					No data		Mk 1 Med. Sq. Grain 160g.
Incendiary (Liquid) Type Undet.	(Sq. Grain 265 g.)						
Vomit Gas Type Undet.	No data	No data					

KEY: Blank signifies that the indicated combination of projectile and propellant case has neither been recovered nor found listed in Japanese documents.

"No data" indicates that this combination is listed in documents or has been recovered, but that no information on the propellant is available.

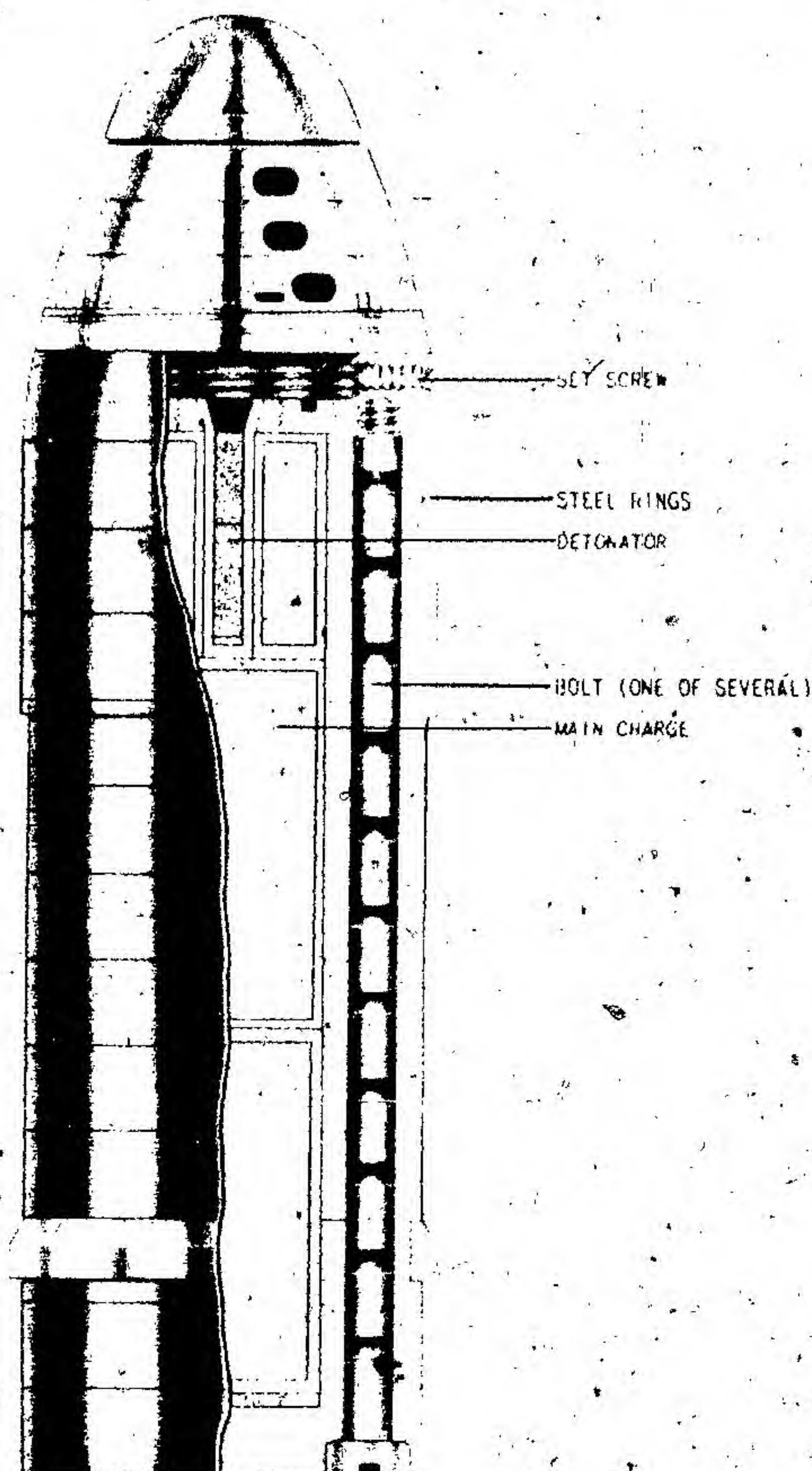


Figure 247—7-cm High-Explosive Antiaircraft Projectile.

7-cm (75-mm) H. E.-A. A. Projectile

Note.—The drawing given here is based on a Japanese drawing labelled only "Circular-layered projectile." The projectile is of apparent 75-mm size and the body appears to be made up of numerous steel rings bolted together with several bolts which are grooved at intervals to produce better fragmentation.

This projectile is believed to be the same referred to in other documents as "H. E.-A. A. Projectile" for the Type 11th-year field A. A. gun.

The following applies only if this presumption is correct.

Weight of projectile, filled (fuzed): 6.60 kg. (14.52 pounds).

Filling: "ONA," a mixture of picric acid and dinitronaphthalene.

Fuzing: Type 10-year A. A. powder time fuze.

Weapons in which used: Type 11-year field A. A. gun.

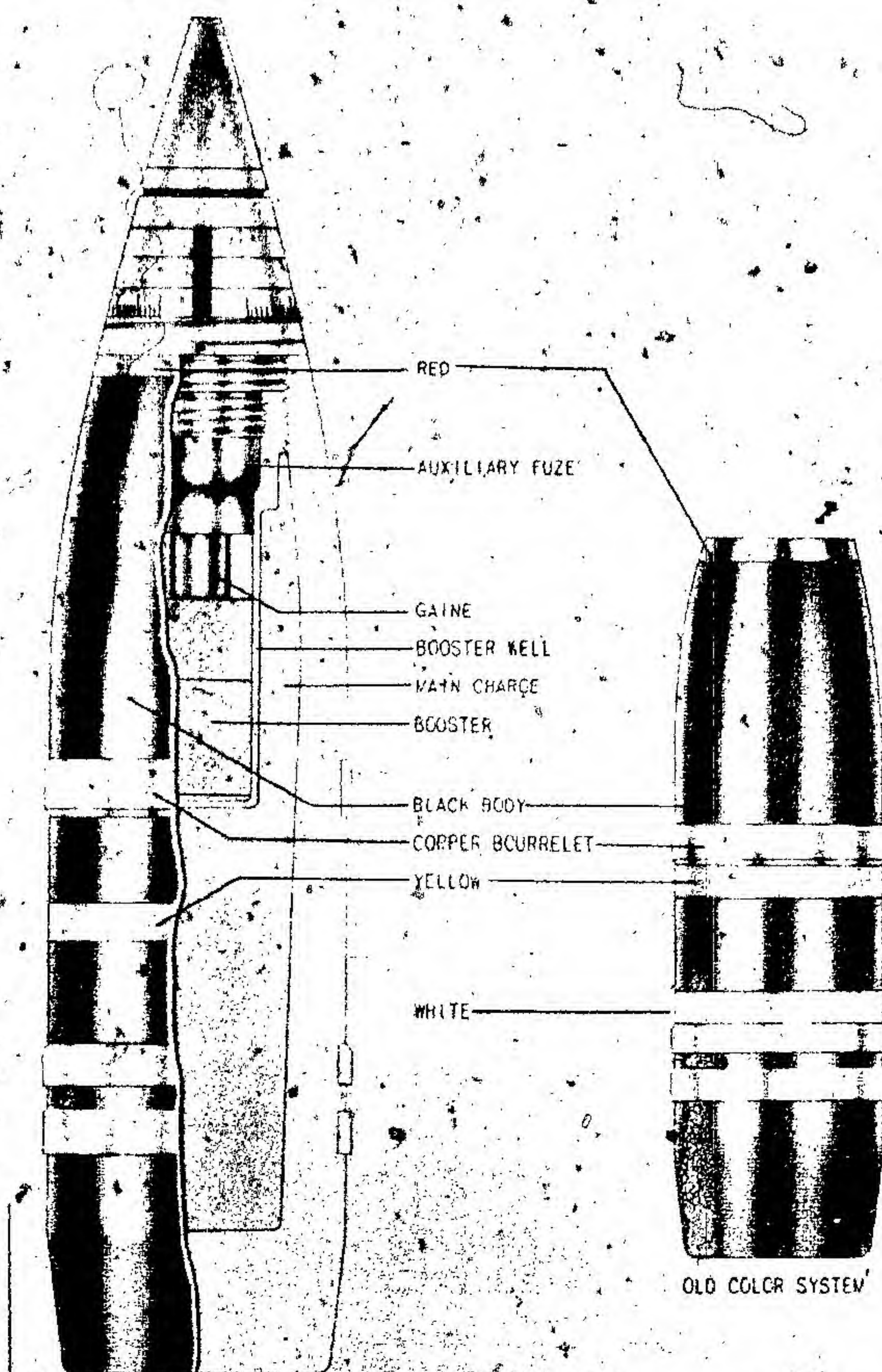


Figure 248—Type 90 7-cm High-Explosive Antiaircraft Long-Pointed Projectile.

Type 90 7-cm (75-mm) H. E.-A. A. Long-Pointed Projectile

Weight of projectile, filled (TNT): 6.53 kg. (14.37 pounds).

Weight of filling: 0.385 kg. (0.85 pound).

Filling: Standard, TNT cast directly into lacquered cavity (recovered); alternate, picric acid (documentary evidence).

Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): 257 mm (10 1/8 inches).

Length projecting from case: 202 mm (7 7/8 inches).

Width of forward rotating band: 9.5 mm.

Width of after rotating band: 9.5 mm.

Width of space between rotating bands: 6.5 mm.

Width of copper bourrelet: 14 mm.

Distance from base to after edge of bourrelet: 140 mm.

Fuzing: Type 89 long-pointed powder time fuze in nose. An auxiliary fuze armed by setback and centrifugal force is used immediately below the time fuze.

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Weapons in which used:

Type 11th-year 7.5-cm field A. A. gun.

Type 88 7-cm field A. A. gun, case, 19 $\frac{1}{16}$ inches.

Type 88 7-cm field A. A. gun (special), case, 19 $\frac{1}{16}$ inches.

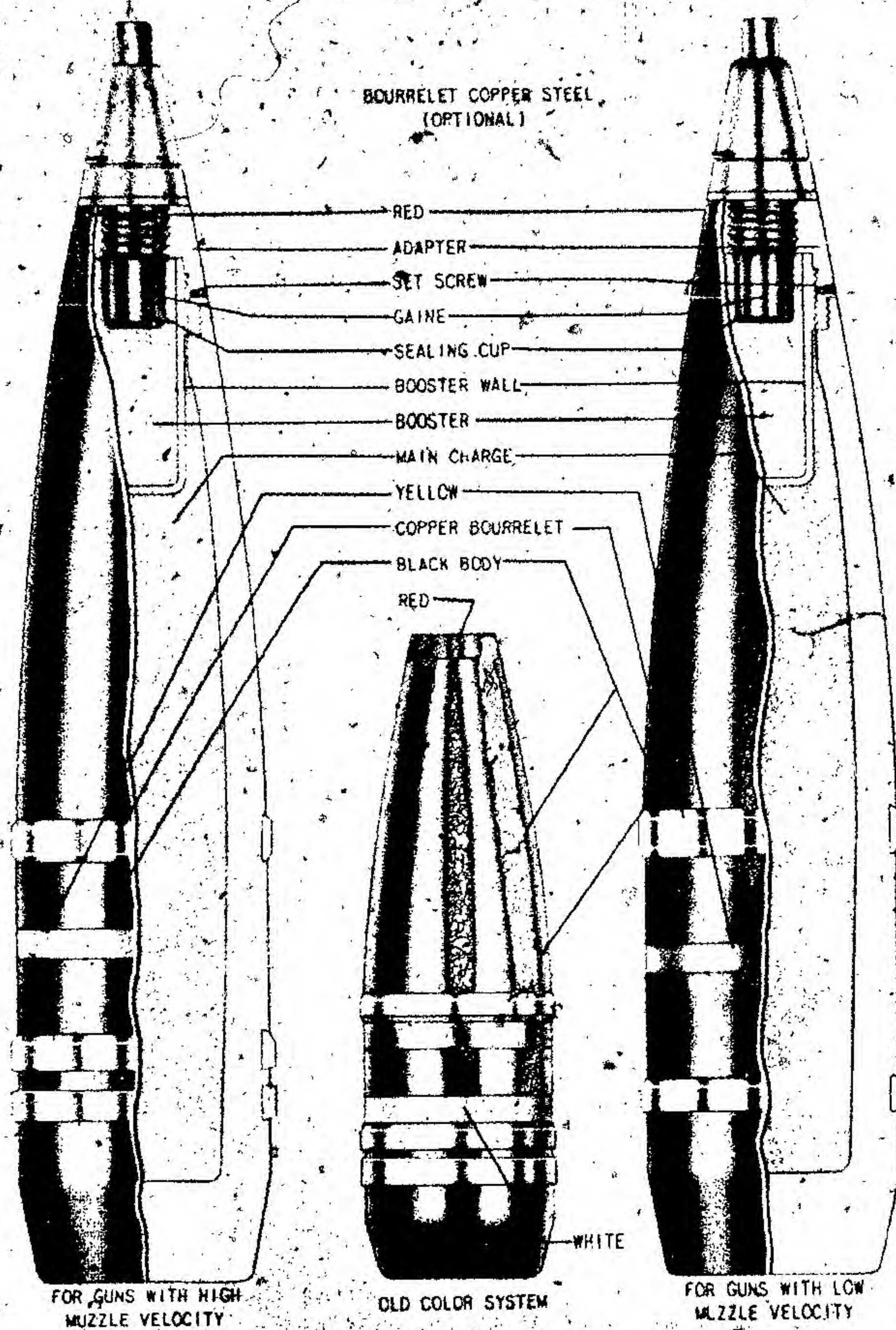


Figure 249—Type 90 7-cm High-Explosive Long-Pointed Projectile.

Type 90 7-cm (75-mm) H. E. Long-Pointed Projectile

Weight of Projectile, Filled (without fuze) (TNT):
6.17 kg. (13.62 pounds).

Weight of filling: 0.49 kg. (1.08 pounds).

Filling:

Standard, TNT cast directly into a lacquered cavity (documentary).

Alternate, "HEINEI" trinitrophenetole (recovered).

Indicated by 平準 painted on body.

Diameter at bourrelet: 75.0 mm (minus tol.).

Length over all (without fuze): 317.5 mm (12 1/2 inches).

Length protruding from case: 267.0 mm (10 3/4 inches).

Width of rotating bands:

Upper: 10.6 mm.

Lower: 9.6 mm.

Fuzing:

Type 88 instantaneous (gun).

Type 88 delay (gun).

Operation and employment: It is believed this projectile was designed primarily to adapt the type 88, 75 mm, high velocity A. A. gun to a dual-purpose field gun (i. e., for air and ground targets). The ballistic form of this projectile approx-

imates that of the type 90 long-pointed A. A. projectile, when the A. A. time fuze is installed. The projectile is also used for other weapons, as shown below.

Weapons in Which Used.

Type 88 field A. A. (special), case, 19 1/16 inches.

Type 38 field gun group (four weapons), case, 11 1/8 inches.

Type 90 field gun, case, 16 1/16 inches.

Type 94 mountain gun.

Remarks: When this projectile is cased for use in the type 88 field A. A. gun (special), a reduced propelling charge is used. This reduced charge is indicated by a Roman numeral II stenciled on the case.

Type 94 7-cm (75-mm) High-Explosive Projectile

Weight of projectile, filled (TNT): 6.02 kg. (13.24 pounds).

Weight of filling: 0.81 kg. (1.78 pounds).

Filling:

Standard, TNT cast directly into lacquered cavity.

Alternate, (1) "ANGA" (ammonium nitrate, RDX). 安瓦

Alternate, (2) "HEINEI" (trinitrophenetole). 平準

Diameter at bourrelet: 75 mm (minus tol.).

Length over-all (without fuze): 303 mm (11 7/8 inches).

Length protruding from case: 264 mm (10 3/8 inches).

Width of rotating band: 10 mm.

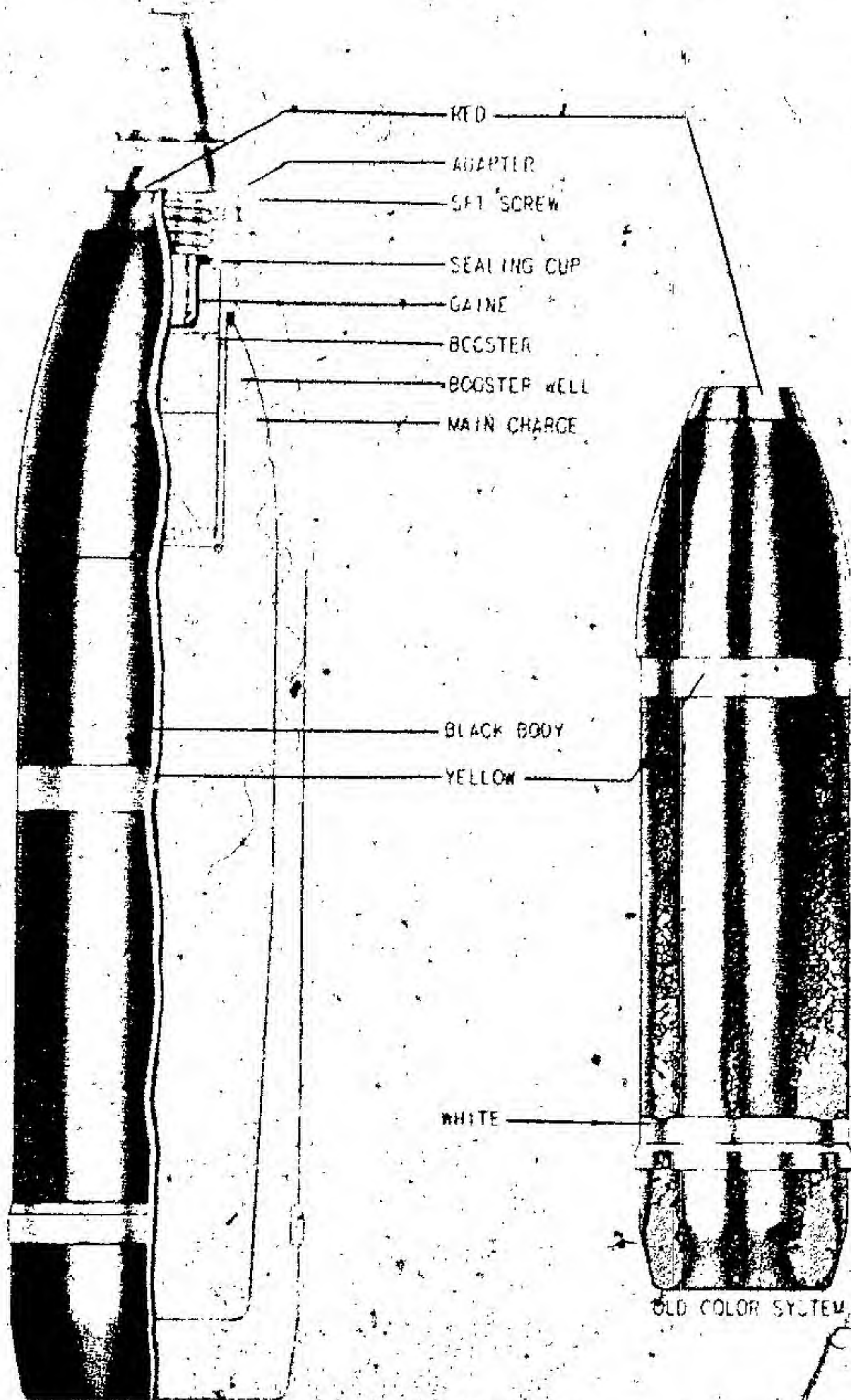


Figure 250—Type 94 7-cm High-Explosive Projectile.

Fuzing: Type 88 instantaneous nose fuze (gun type); type 88 short-delay nose fuze (gun type):

Weapons in which used:

✓ Type 41 mountain gun (regimental gun): Case, 7 $\frac{1}{4}$ inches.

Type 94 mountain gun: Case 11 $\frac{1}{8}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{8}$ inches.

Type 88 field A. A. gun: Case, 19 $\frac{1}{8}$ inches.

Type 88 field A. A. (special) gun: Case 19 $\frac{1}{8}$ inches.

Type 90 field gun: Case, 16 $\frac{1}{8}$ inches.

Remarks: Two other designs, essentially the same as the type 94 are known:

1. H. E., type 10 year.

2. H. E., type 90.

These have the same over-all length as the type 94, and have the same external form and general construction except for the following features:

1. The explosive cavity does not taper in the base as in the type 94, but is straight-sided.

2. The slight boat-tail present on the type 94 is absent in the other designs.

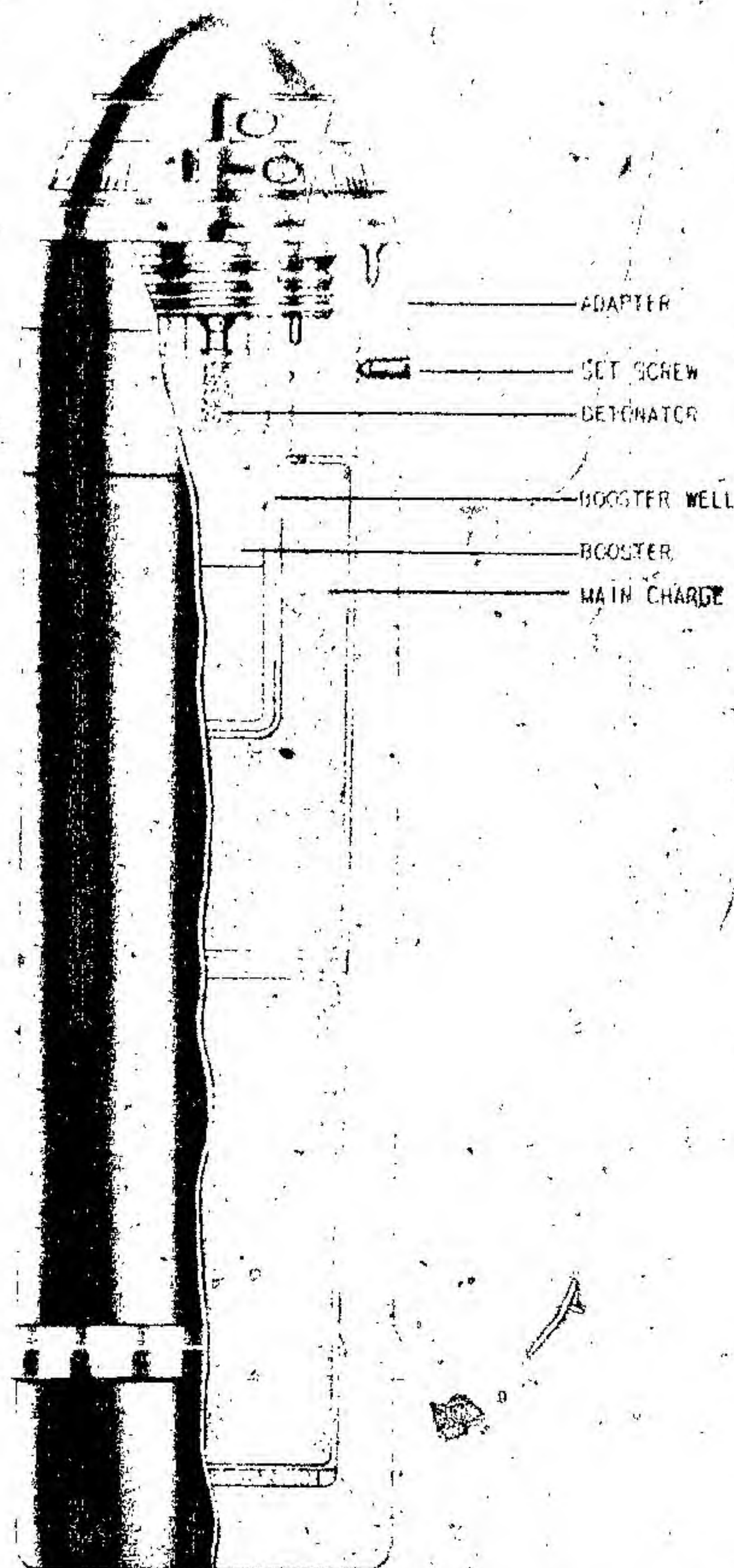


Figure 251—7-cm Design "A" High-Explosive Projectile.

3. Below the rotating band in the type 10-year design only, there is an annular groove into which the case is crimped.

7-cm (75-mm) Design "A" High-Explosive Projectile

Weight of projectile, filled: 6.46 kg. (14.2 pounds).
 Weight of filling: 0.625 kg. (1.38 pound).
 Filling: "ONA", a mixture of picric acid and dinitronaphthalene, in two preformed blocks.
 Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): No data.

Length protruding from case: No data.

Width of rotating band: No data.

Fuzing: Type 3d-year combination time and impact fuze.

Weapons in which used:

Type 41 mountain gun (regimental gun):
 Case, 7 $\frac{1}{4}$ inches.

Type 94 mountain gun: Case, 11 $\frac{1}{4}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{4}$ inches.

Remarks: This is an old projectile and is now obsolete.

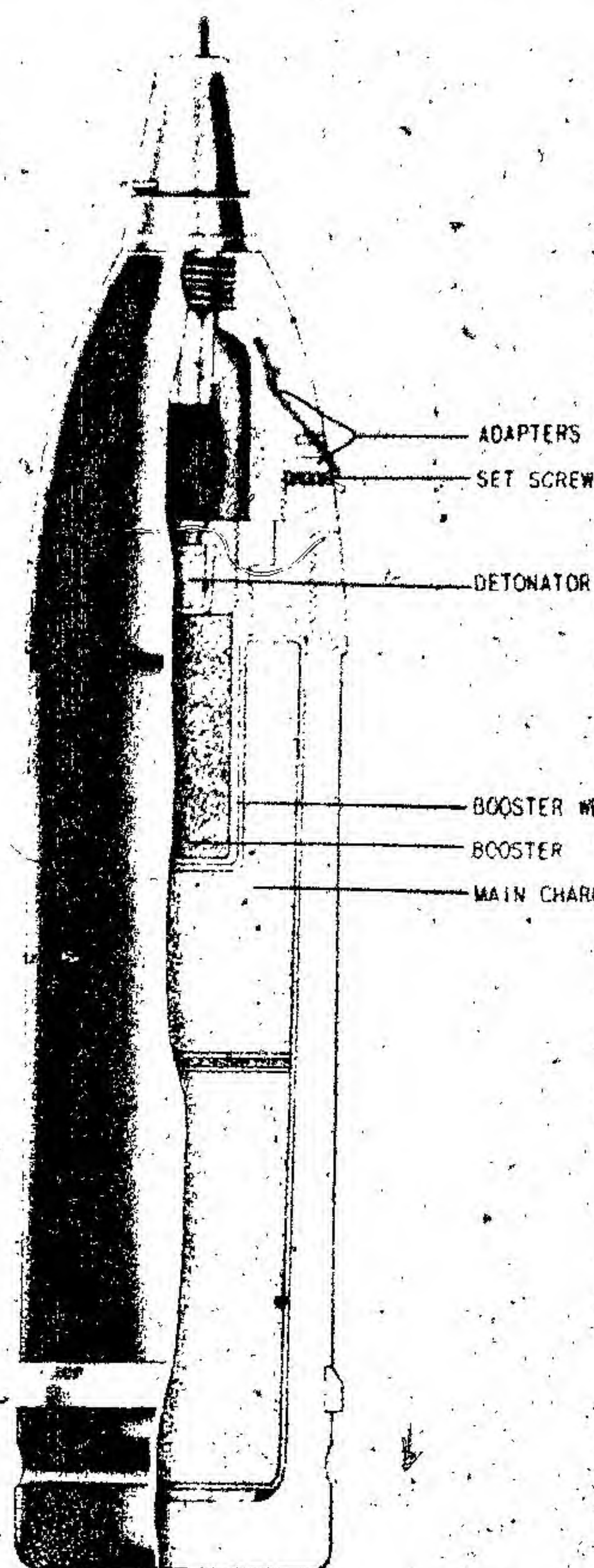


Figure 252—7-cm Design "B" High-Explosive Projectile.

7-cm (75-mm) Design "B" High-Explosive Projectile

Weight of projectile, filled: 6.61 kg. (14.5 pounds).

Weight of filling: 1.24 pounds.

Filling: "ONA", a mixture of picric acid and dinitronaphthalene in two preformed blocks wrapped as a single unit.

Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): 12 $\frac{3}{4}$ inches.

Length protruding from case (without fuze): 10 $\frac{1}{8}$ inches.

Width of rotating band: No data.

Fuzing: Type 88, instantaneous nose fuze (gun type); type 88, short-delay nose fuze (gun type).

Weapons in which used:

Type 41 mountain gun (regimental gun):
Case, 7 $\frac{1}{4}$ inches.

Type 94 mountain gun: Case, 11 $\frac{1}{8}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{8}$ inches.

Remarks: This is an old projectile and is now obsolete.

Type 98 Modified 7-cm (75-mm) High-Explosive Projectile

Weight of projectile, filled: 4.5 kg. (9.9 pounds).
 Weight of filling: 0.95 kg. (2.1 pounds).
 Filling: TNT cast directly into lacquered cavity.
 Diameter at bourrelet: 75 mm (minus tol.).
 Length over all (without fuze): 279 mm (11 inches).
 Length protruding from case: 240 mm (9½ inches).
 Width of rotating band: 10 mm.

Fuzing: Type 88 instantaneous nose fuze (gun type); type 88 short-delay nose fuze (gun type).

Weapons in which used:

Type 41 mountain gun (regimental gun):
 Case, 7¼ inches.

Type 38 field gun group: Case, 11¼ inches.

Remarks: The body of this projectile was designed for use as a shrapnel projectile employing a large combination fuze. In the converted form, the projectile is filled with TNT instead of

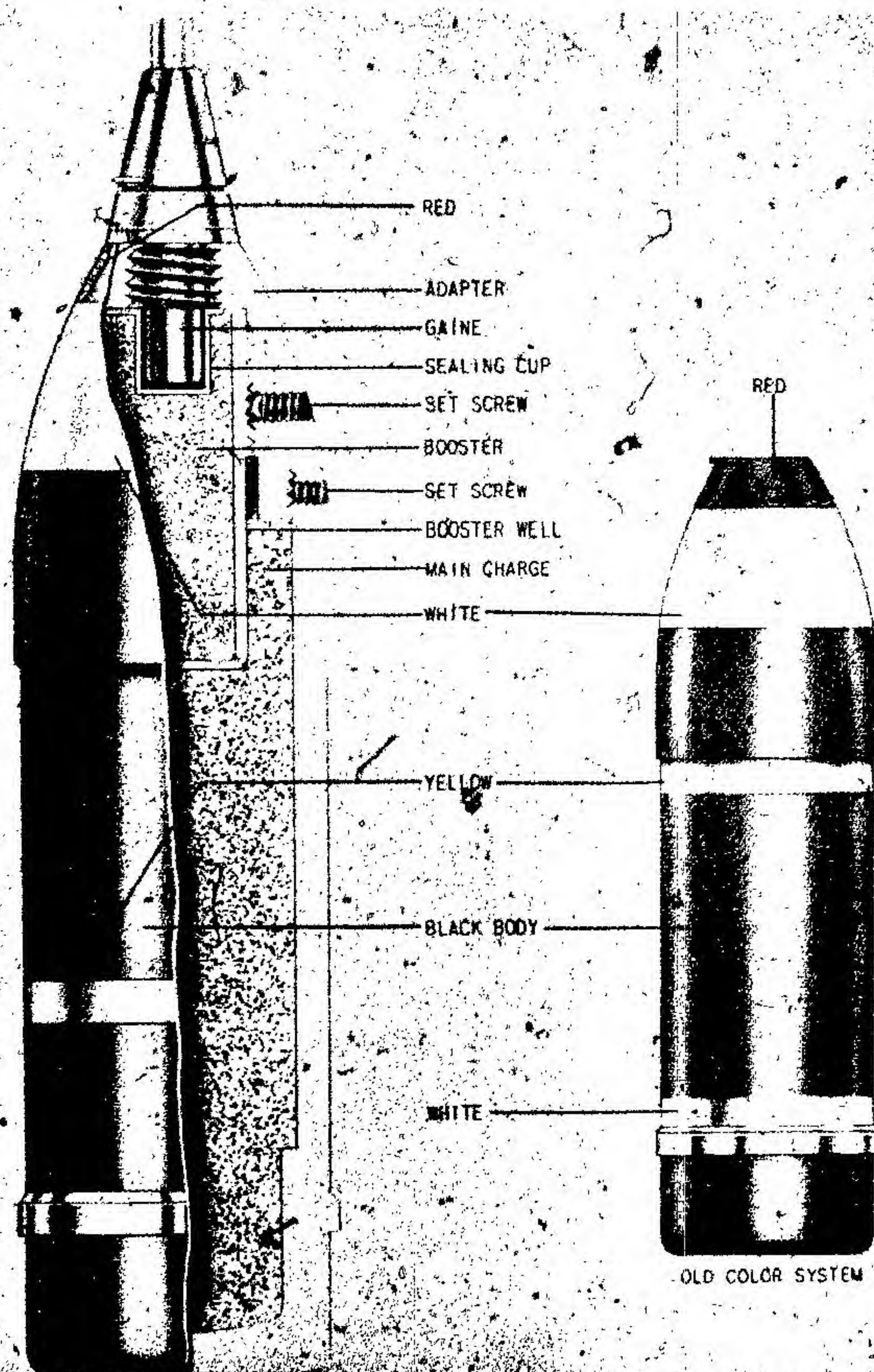


Figure 253—Type 98 Modified 7-cm High-Explosive Projectile.

the shrapnel filling of lead balls, and a large ogival adapter permits the use of standard point-detonating fuzes and a standard H. E. booster.

Distinctive marking for this projectile is attained by painting the large adapter white.

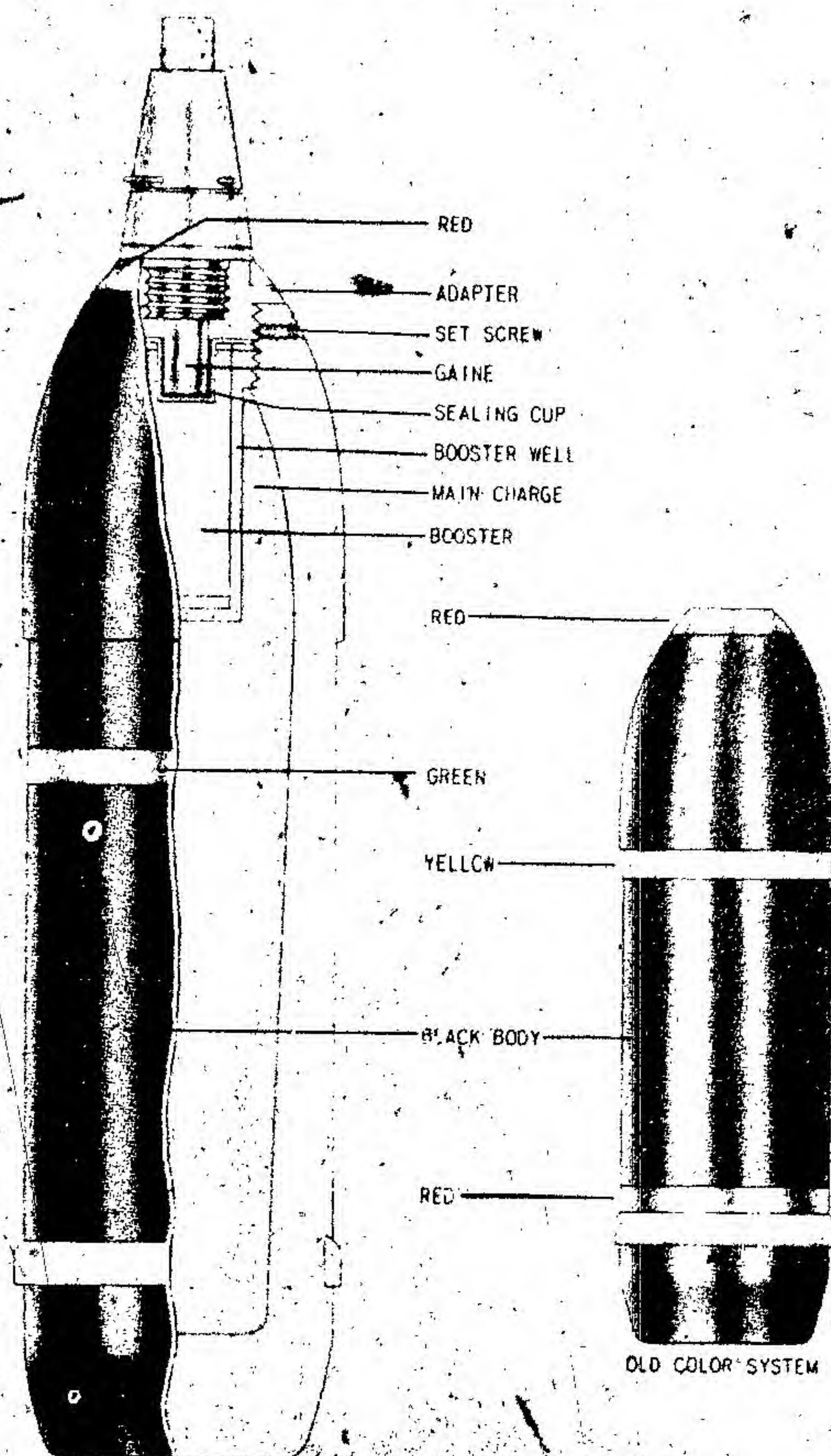


Figure 254—Type 90 7-cm High-Explosive Semisteel Projectile.

Type 90 7-cm (75-mm) High-Explosive Semi-steel Projectile

Weight of projectile, filled: 6.18 kg. (13.7 pounds).
 Weight of filling: 0.42 kg. (0.92 pound).
 Filling: Cast TNT.
 Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): No data.

Length protruding from case (without fuze): 253 mm (9 $\frac{1}{8}$ inches).

Width of rotating band: 10 mm.

Fuizing: Type 88 instantaneous nose fuze (gun type); type 88 short-delay nose fuze (gun type).

Weapons in which used:

Type 41 mountain gun (regimental gun):
Case, 7 $\frac{1}{4}$ inches.

Type 94 mountain gun: Case, 11 $\frac{1}{16}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{16}$ inches.

Type 90 field gun: Case, 16 $\frac{1}{16}$ inches.

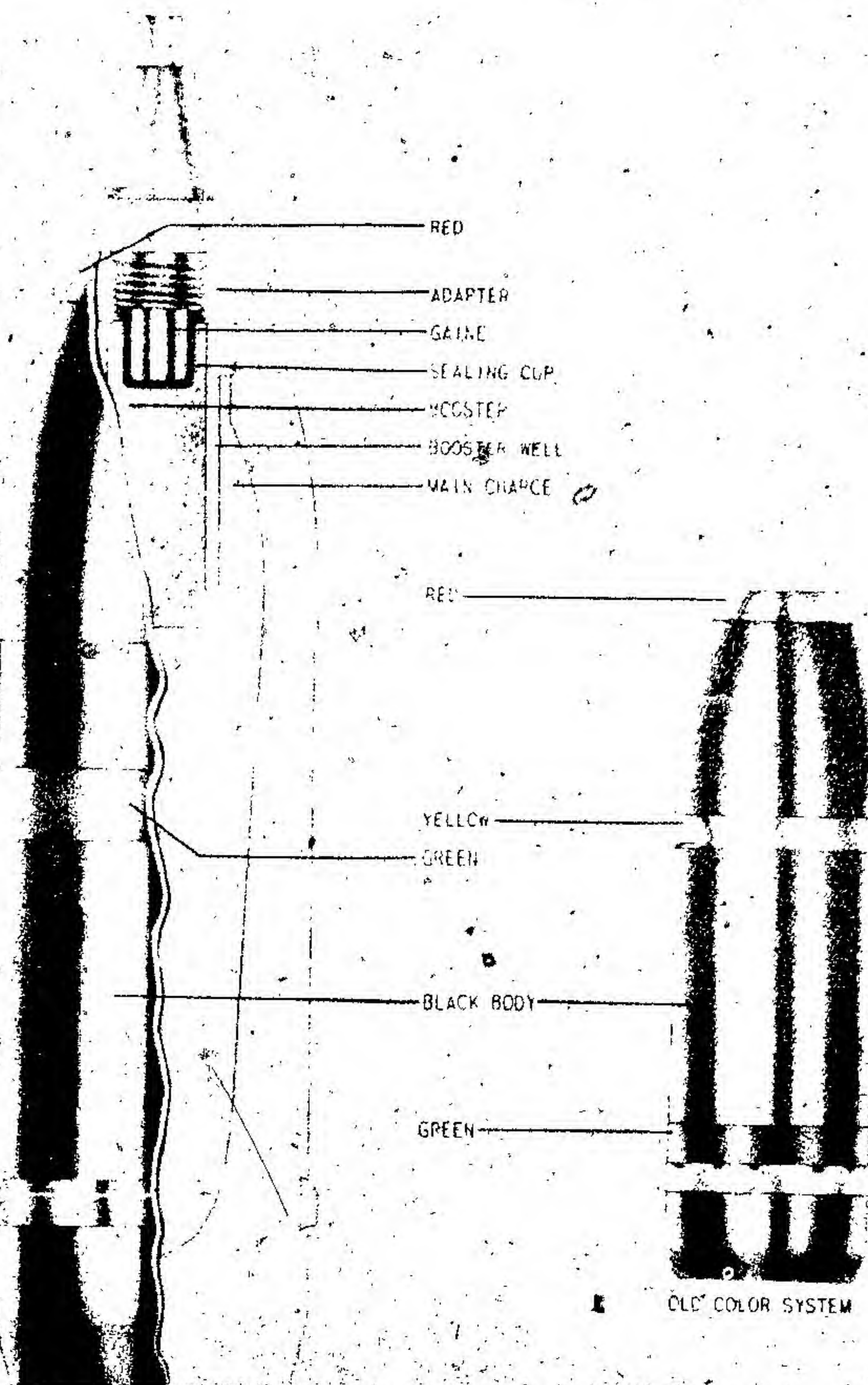


Figure 255—Type 97 7-cm High-Explosive Semisteel Projectile.

Type 97 7-cm (75-mm) H. E. Semisteel Projectile

Weight of projectile, filled: 5.5 kg. (12.1 pounds).

Weight of filling: 0.45 kg. (0.99 pound).

Filling: TNT cast directly into lacquered cavity.

Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): 302 mm (11 $\frac{7}{8}$ inches).

Length protruding from case (without fuze):
No data.

Width of rotating band: 10 mm.

Fuzing: Type 88 instantaneous nose fuze (gun type); Type 88 short-delay nose fuze (gun type).

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Weapons in which used:

Type 41 mountain gun: Case, 7 $\frac{1}{4}$ inches.

Remarks: Because of the low tensile strength of the steel employed, the base must be extremely thick to withstand the forces in the gun.

Type 90 "A" 7-cm (75-mm) Substitute Projectile

Weight of projectile, filled: 6.92 kg. (15.25 pounds).

Weight of filling: 0.10 kg.

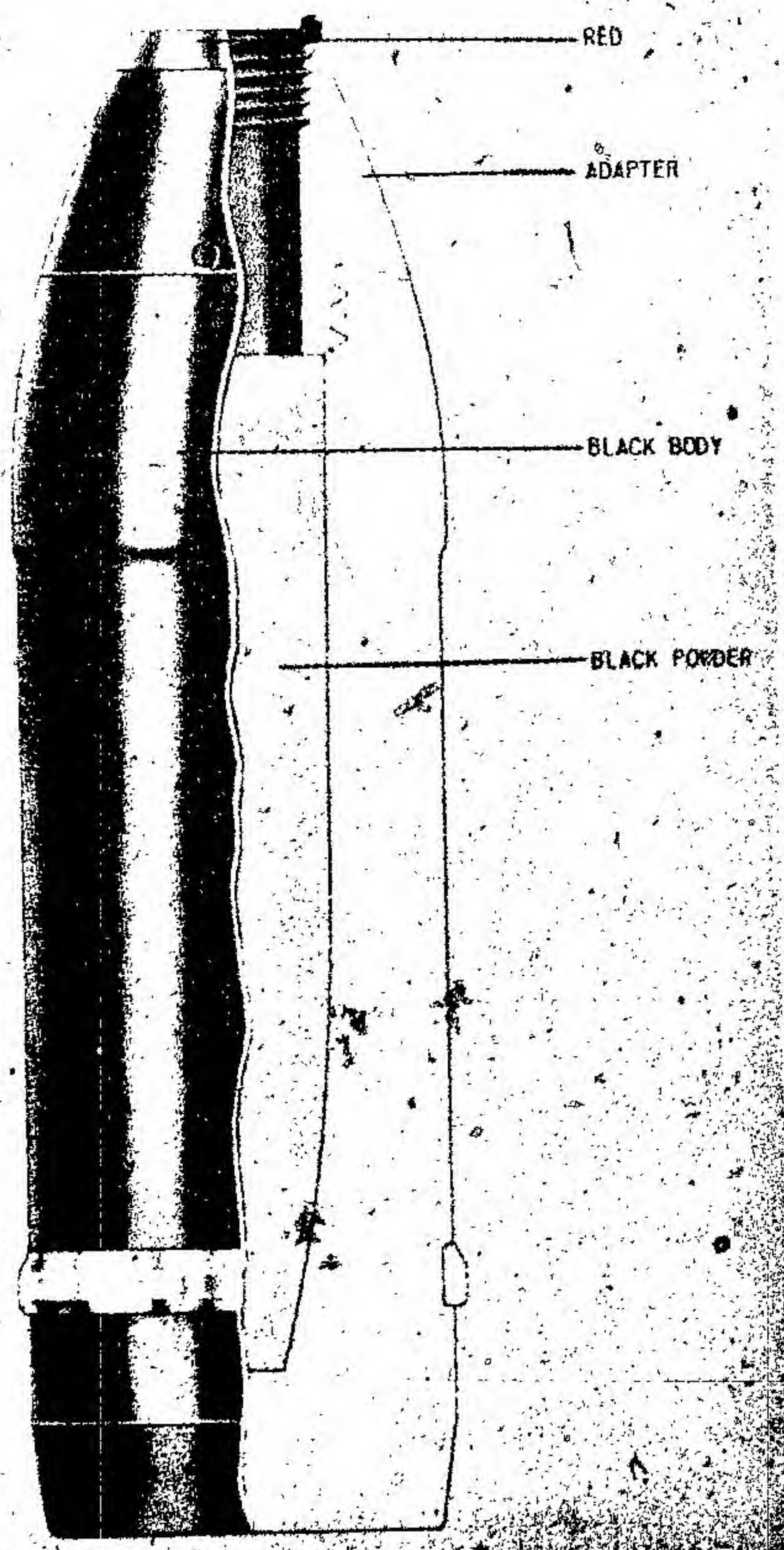


Figure 256—Type 90 "A" 7-cm Substitute Projectile.

Filling: Black powder.

Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): 256 mm (10 $\frac{1}{8}$ inches).

Length protruding from case (without fuze): 218 mm (8 $\frac{5}{8}$ inches).

Width of rotating band: 10 mm.

Fuzing: Type 88 instantaneous nose fuze (gun type); type 88 short-delay nose fuze (gun type).

Weapons in which used:

Type 41 mountain gun (regimental gun): Case, 7 $\frac{1}{4}$ inches.

Type 94 mountain gun: Case, 11 $\frac{1}{8}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{8}$ inches.

Type 90 field gun: Case, 16 $\frac{1}{8}$ inches.

Remarks: This projectile is made of cast iron and has very thick walls.

Type 2 7-cm (75-mm) Hollow-Charge Projectile

Weight of projectile, filled (without fuze): 3.56 kg. (7.81 pounds).

Weight of filling: 0.50 kg. (1.11 pounds).

Filling: A cast mixture of 60 percent TNT and 40 percent cyclonite (RDX) wrapped in varnished paper.

Diameter at bourrelet: 75.0 mm (minus tol.).

Length over all (without fuze): 240.0 mm (9 $\frac{3}{4}$ inches).

Length protruding from case: 210 mm (8 $\frac{1}{4}$ inches).

Length of projectile body (without nose cap): 183.0 mm (7 $\frac{1}{8}$ inches).

Width of rotating band: 10.0 mm.

Fuzing: Type 88 instantaneous (gun type).

Operation and Employment: This round is used principally as an antitank weapon. In firing tests it penetrated 3 inches of Navy hull plate (Headquarters USAFISPA, Office of the A. C. of S., G-2 Ordnance Intelligence Unit Report No. 41, entitled "Firing Tests of Japanese Anti-tank Weapons").

Weapons in which used:

Type 94 mountain gun: Case, 11 $\frac{1}{8}$ inches.

Type 41 mountain gun: Case, 7 $\frac{1}{4}$ inches.

Remarks: 1. There is a marked similarity between this projectile and German hollow-charge rounds, both in projectile design and in explosive filling.

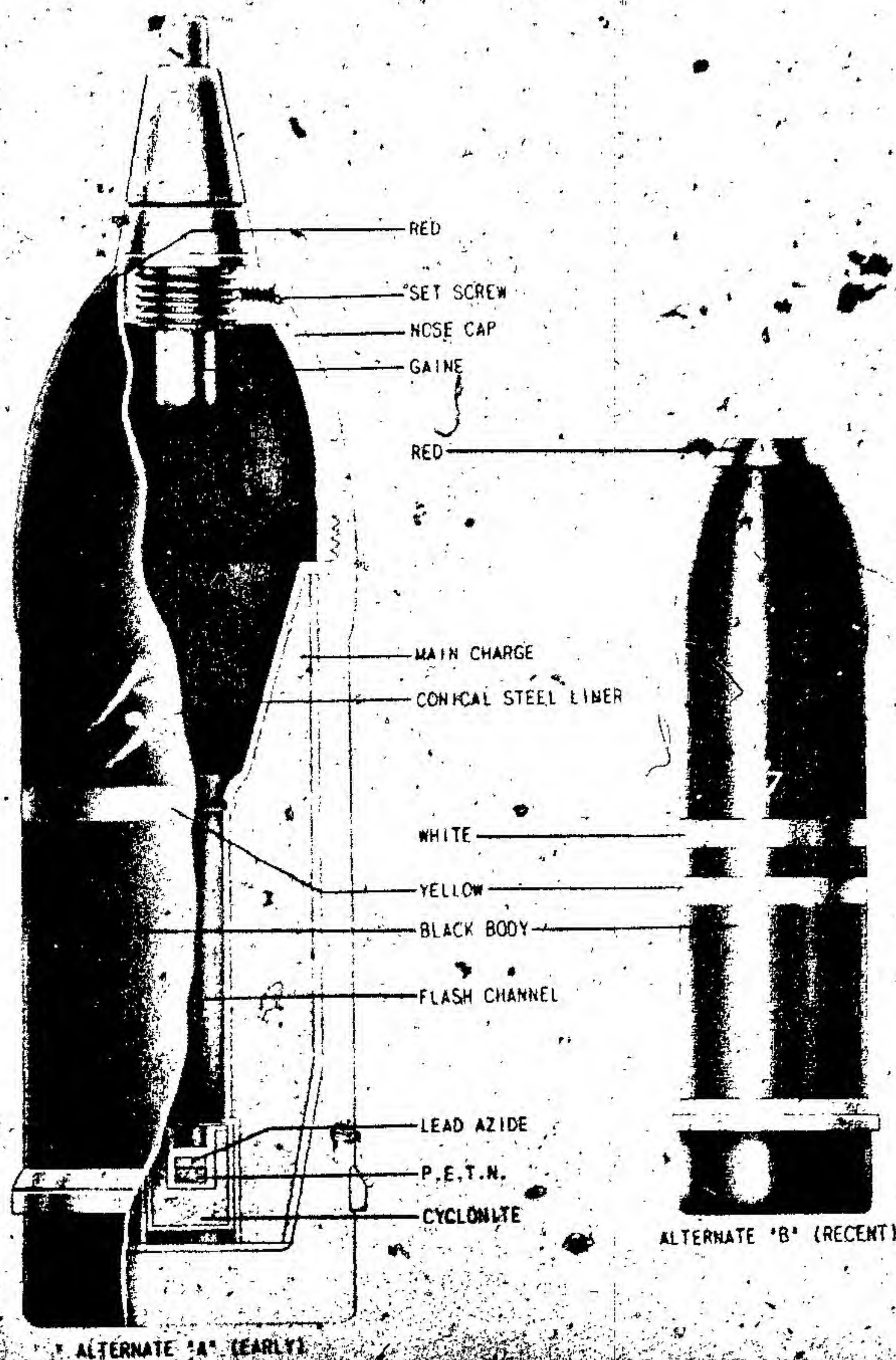


Figure 257—Type 2 7-cm Hollow-Charge Projectile.

2. The symbol TA stenciled on this projectile is employed in other Japanese munitions to indicate hollow-charge design.

3. In the earliest rounds found, the projectiles were marked by a yellow band around the middle of the body, indicating "High-Explosive" according to the new color system. Later recoveries

indicate the adoption of the combination of white band, used to indicate "Armor Piercing," together with the yellow band. Both bands appear near the middle of the body. This arrangement is not to be confused with the use, in the old color system, of a yellow band above a white band for marking "High-Explosive" projectiles.

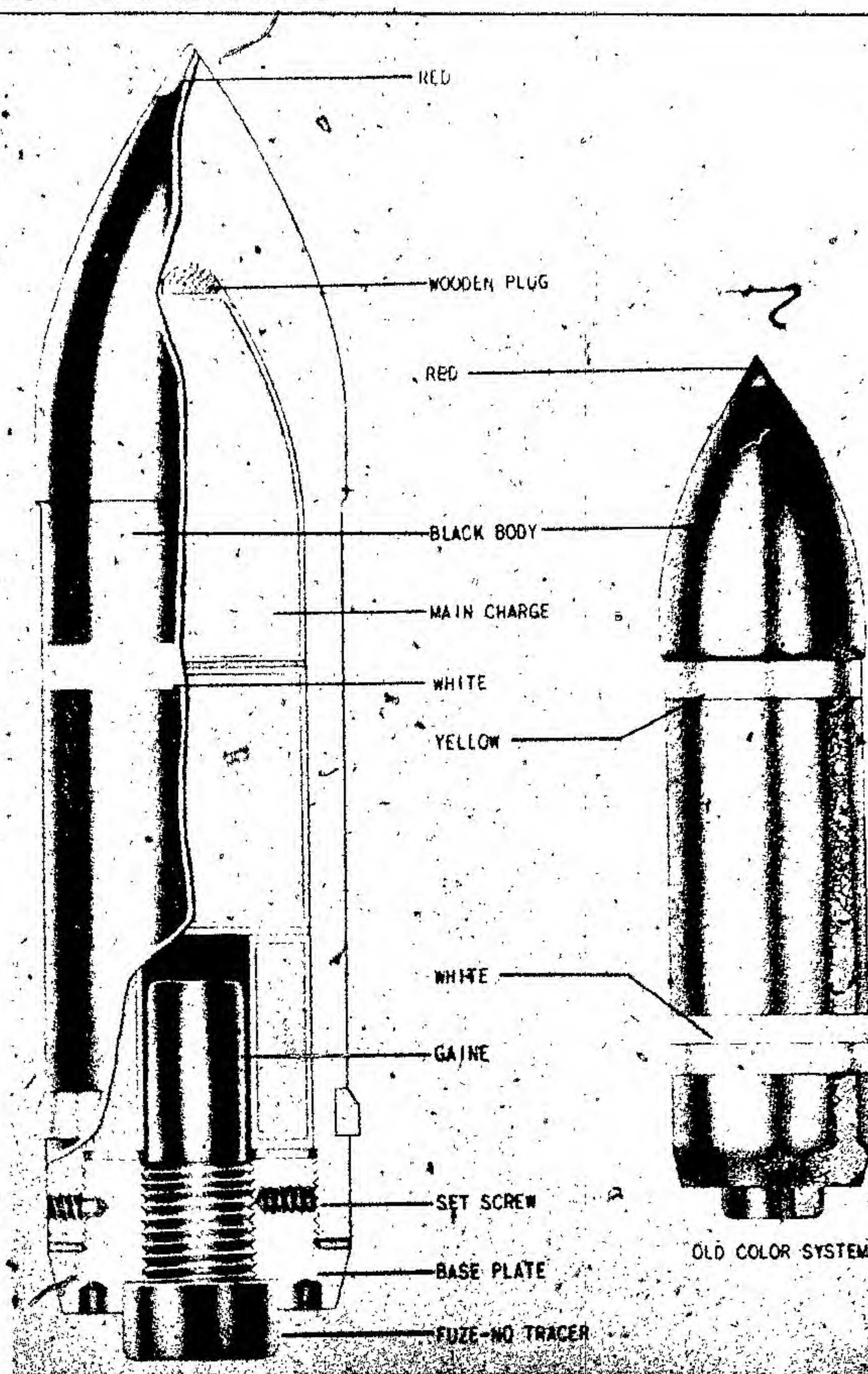


Figure 258—Type 95 7-cm Armor-Piercing High-Explosive Projectile.

Type 95 7-cm (75-mm) Armor-Piercing High-Explosive Projectile

Weight of projectile, filled (fuzed): 6.21 kg. (13.66 pounds).

Weight of filling: 0.46 kg. (1.01 pounds).

Filling: "ONA" a mixture of picric acid and dinitronaphthalene.

Diameter at bourrelet: 75.0 mm (minus tol.).

Length over all (without fuze): No data.

Length protruding from case: 265.5 mm (10 $\frac{1}{4}$ inches).

Width of rotating band: No data.

Fuzing: Type 95 small base fuze.

Weapons in which used:

Type 41 mountain gun (regimental gun): Case, 7 $\frac{1}{4}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{2}$ inches.

Type 90 field gun: Case, 16 $\frac{1}{2}$ inches.

Type 94 mountain gun: Case, 11 $\frac{1}{2}$ inches.

Type 88 7 cm field A. A. gun (special): Case, 19 $\frac{1}{2}$ inches.

Penetrating power: When used in the type 41 mountain gun this projectile is designed to pene-

trate 20 mm of steel plate at a maximum range of 3,000 meters.

Remarks: By design, this projectile is intended for a function intermediate between that of H.

E. projectiles and true armor-piercing types. For this reason the Japanese designate it "A. P.-H. E." A. P.-H. E. projectiles are painted like the H. E. rather than the A. P. class.

Type 1 7-cm (75-mm) Armor-Piercing Projectile

Weight of projectile, filled (fused): 6.56 kg. (14.4 pounds).

Weight of projectile, empty (without fuze and gaine): 6.14 kg. (13.5 pounds).

Weight of filling: 0.053 kg. (0.12 pounds).

Filling: A mixture of 90 percent cyclonite (R D X) and 10 percent paraffin, coated with graphite and packed in an aluminum foil wrapper.

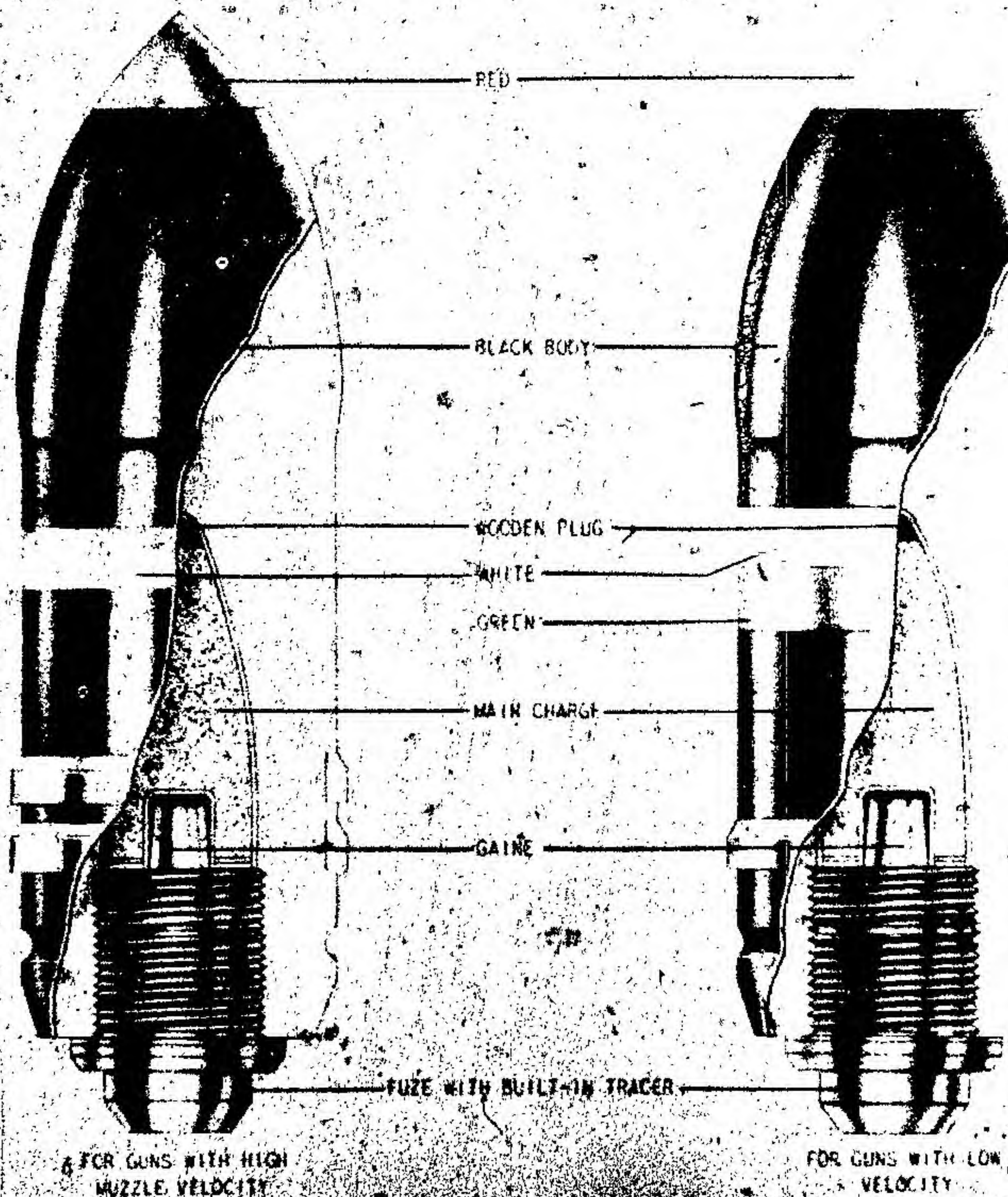


Figure 259—Type 1 7-cm Armor-Piercing Projectile.

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Diameter at bourrelet: 75.0 mm (minus tol.).
Length over all (without fuze): 240.0 mm (9 $\frac{1}{2}$ inches).
Length protruding from case: 200.0 mm (7 $\frac{1}{2}$ inches).
Width of rotating band: 10.0 mm.
Fuzing: Medium Mk I base fuze (short delay) with red tracer.
Operation and employment: This projectile was evidently developed to adapt the type 41 and type 94 guns for use as antitank weapons.
Weapons in which used:
Type 94 mountain gun: Case, 11 $\frac{1}{2}$ inches.

Type 41 mountain or regimental gun: Case, 7 $\frac{1}{2}$ inches.

Type 90 field gun: Case, 16 $\frac{1}{2}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{2}$ inches.

Remarks: Identical projectiles, all with tracer, have been found marked with either a single white band near the middle of the body or with white-and-green double band (green in conjunction with another band indicates presence of tracer). It is believed that this represents optional marking in the new system rather than old and new marking.

Type 38 7-cm (75-mm) Shrapnel Projectile

Weight of projectile: 6.83 kg. (15.0 pounds).
Bursting charge: 0.10 kg. (0.22 pound). Black powder contained in the base of the projectile and in a central brass tube.
Diameter at bourrelet: 75 mm (minus tol.).
Length over all (without fuze): 250 mm (9 $\frac{1}{2}$ inches).
Length protruding from case (without fuze): 188 mm (7 $\frac{3}{4}$ inches).
Width of rotating band: No data.
Fuzing:

Type 3d year combination time and impact fuze.

Type 5th year combination time and impact fuze.

Weapons in which used:

Type 41 mountain gun (regimental gun): Case, 7 $\frac{1}{2}$ inches.

Type 94 mountain gun: Case, 11 $\frac{1}{2}$ inches.

Type 38 field gun group: Case, 11 $\frac{1}{2}$ inches.

Type 90 field gun: Case, 16 $\frac{1}{2}$ inches.

Remarks: All guns except type 90 field gun and type 94 mountain gun use the type 3d year fuze in this projectile. Type 90 field gun uses type 5th year fuze only; type 94 mountain gun uses either fuze.

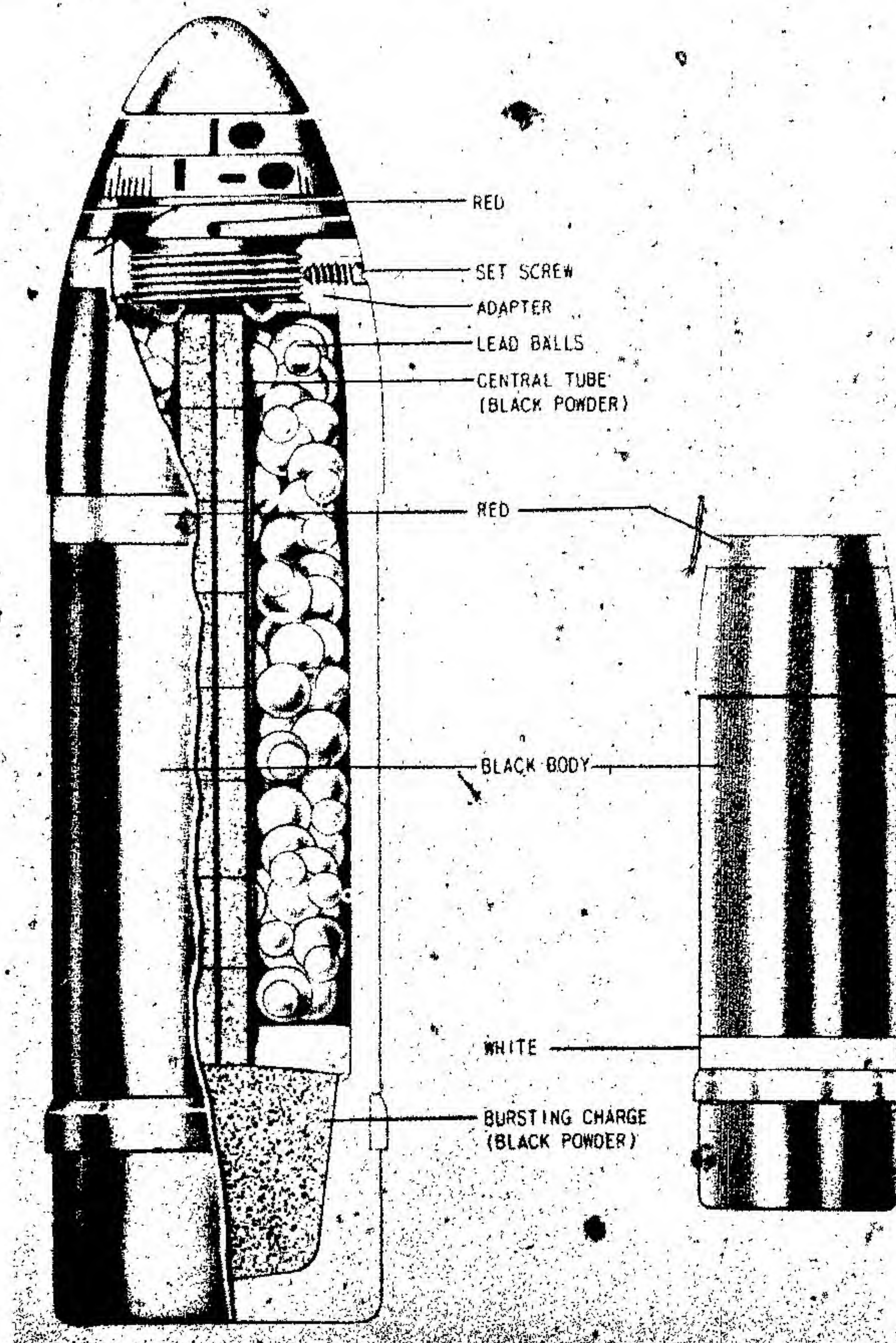


Figure 260—Type 38 7-cm Shrapnel Projectile:

Type 90 7-cm (75-mm) Shrapnel Projectile

Weight of projectile, filled: 7.00 kg. (15.4 pounds).
 Bursting charge: 0.100 kg. (0.22 pound). Black powder contained in base of the projectile and in a central brass tube.

Shrapnel filling: Approximately 272 lead balls (10.5 grams each) packed in a rosin matrix. The balls are separated from the bursting charge in the base by a steel disk which rests on a shoulder in the projectile cavity.

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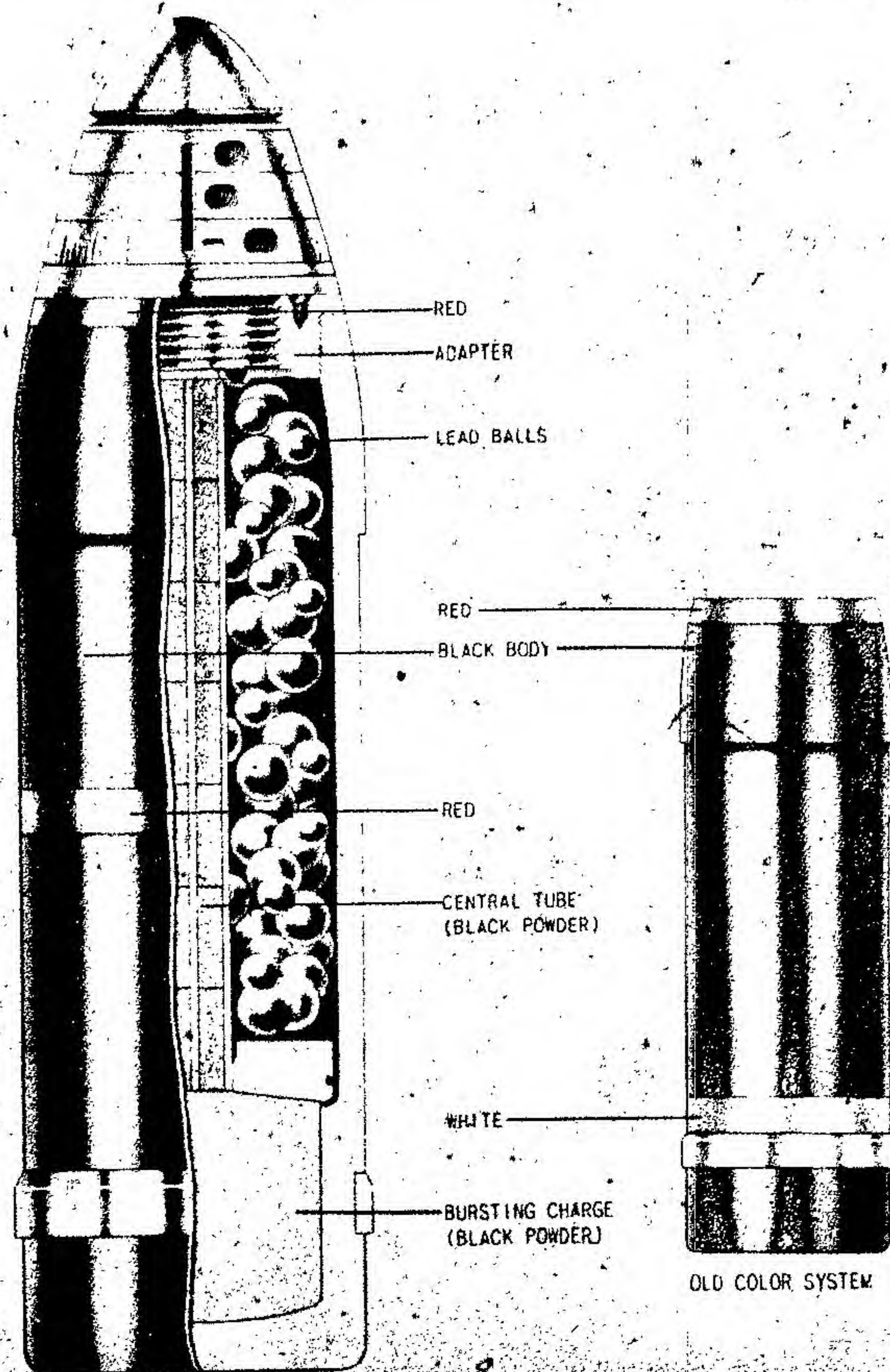


Figure 261—Type 90 7-cm Shrapnel Projectile.

Diameter at bourrelet: 75 mm (minus tol.).
 Length over all (without fuze): 235 mm (9 1/4 inches).
 Length protruding from case (without fuze): 197 mm (7 3/4 inches).
 Width of rotating band: 10 mm.
 Fuzing: Type 5th year combination time and impact fuze.

Weapons in which used:

Type 41 mountain gun (regimental gun):
 Case, 7 1/4 inches.
 Type 94 mountain gun: Case, 11 1/4 inches.
 Type 38 field gun group: Case, 11 1/4 inches.
 Type 90 field gun: Case, 16 1/4 inches.

7-cm (75-mm) Smoke (W. P.) Projectile

Weight of projectile, filled: No data.

Weight of bursting charge: No data.

Bursting charges: Black powder in base of projectile. Filling of central exploder tube is probably also black powder.

Chemical agent: White phosphorus in a sealed can which slips into the cavity of the projectile and through which passes the exploder tube.

Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): No data.

Length protruding from case (without fuze): No data.

Width of rotating band: No data.

Fuzing: Type 3d year combination time and impact fuze.

Remarks: This projectile appears to be a converted type 90 shrapnel projectile.

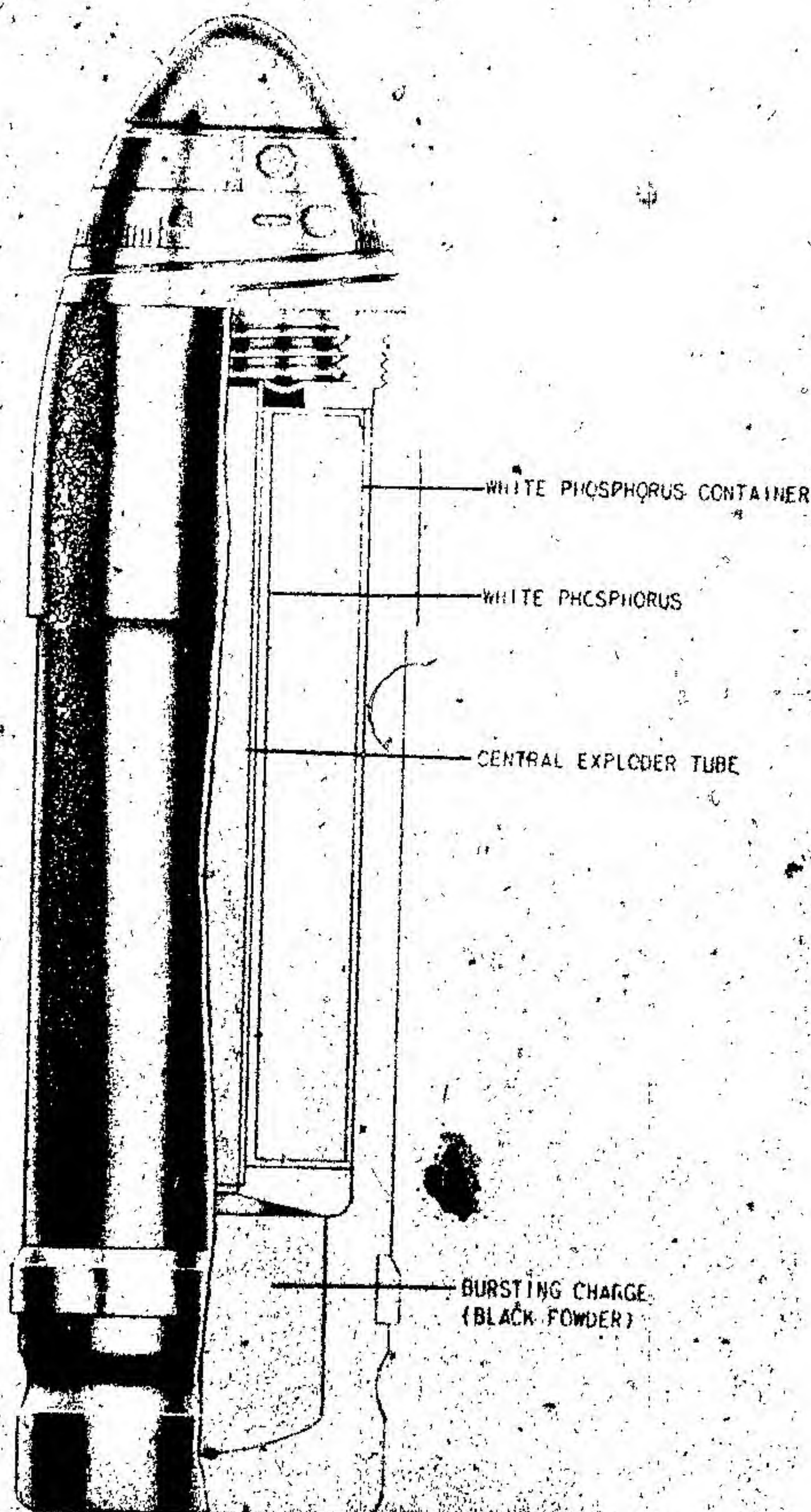


Figure 262—7-cm Smoke (W. P.) Projectile.

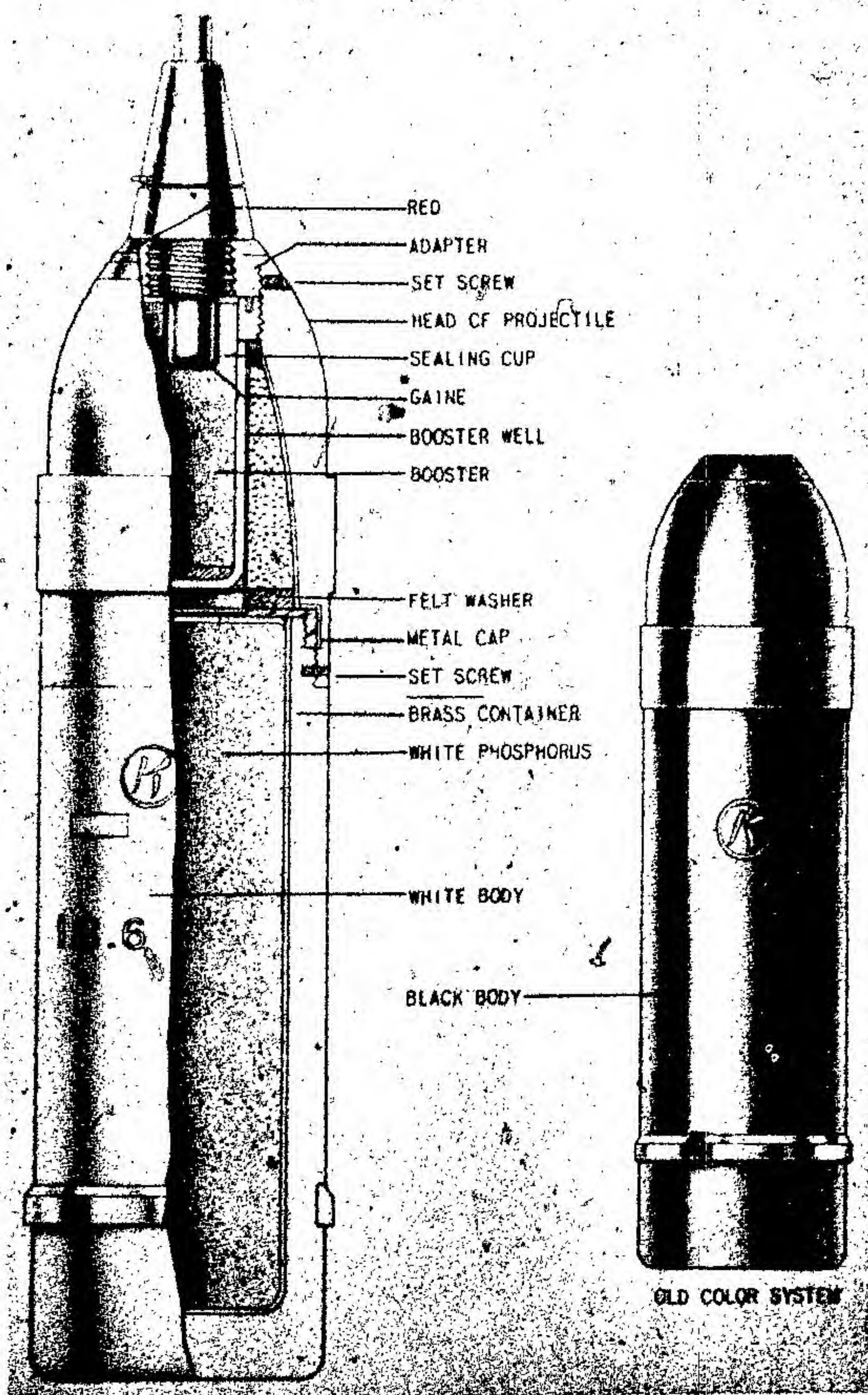


Figure 263—Type 90 7-cm Smoke (W. P.) Projectile.

**Type 90 7-cm (75-mm) Smoke (W. P.)
Projectile**

Weight of projectile, filled: 5.72 kg. (12.60 pounds).
Bursting charge: 0.10 kg. (0.22 pound). "ONA",
a 50-50 mixture of picric acid and dinitro-
naphthalene in a preformed, paper-wrapped
block.

Chemical agent: 700 grams. White phosphorus
sealed in a soldered brass can which fits into
the lacquered cavity below the bursting charge.
Diameter at bourrelet: 75 mm (minus tol.).

Length over all (without fuze): 292 mm (11½ inches).

Length projecting from case (without fuze) 253 mm (10 inches).

Width of rotating band: 10 mm.

Fuzing: Type 88 instantaneous nose fuze (gun type).

Weapons in which used:

Type 41 mountain gun (regimental gun):
Case, 7¼ inches.

Type 94 mountain gun: Case, 11½ inches.

Type 38 field gun group: Case, 11½ inches.

Type 90 field gun: Case, 16½ inches.

Screening capacity (Japanese figures):

Height, 20 meters.

Width, 20 meters.

Duration, 1 to 2 minutes.

Type 90 7-cm (75-mm) Incendiary Projectile

Weight of projectile, filled (with fuze): 6.94 kg. (15.3 pounds).

Weight of expelling charge: 20 grams.

Weight of incendiary composition: 530 grams.

Expelling charge: Black powder.

Incendiary composition: Not determined.

Diameter at bourrelet: 75 mm (minus tol.).

Length of projectile (without fuze): No data.

Length protruding from case (without fuze): 213 mm (8½ inches.)

Width of rotating band: No data.

Fuzing: Type 5th year modified combination fuze (gun).

Weapons in which used:

Type 41 mountain gun: Case, 7¼ inches.

Type 94 mountain Gun: Case, 11½ inches.

Type 38 field gun group: Case, 11½ inches.

Type 90 field gun: Case, 16½ inches.

Operation: After a preset time or on impact, the combination fuze fires the expelling charge. This forces the incendiary unit out the base of the projectile and at the same time ignites it. Information pertaining to the incendiary unit is lacking, but the burning compound is apparently a dry composition.

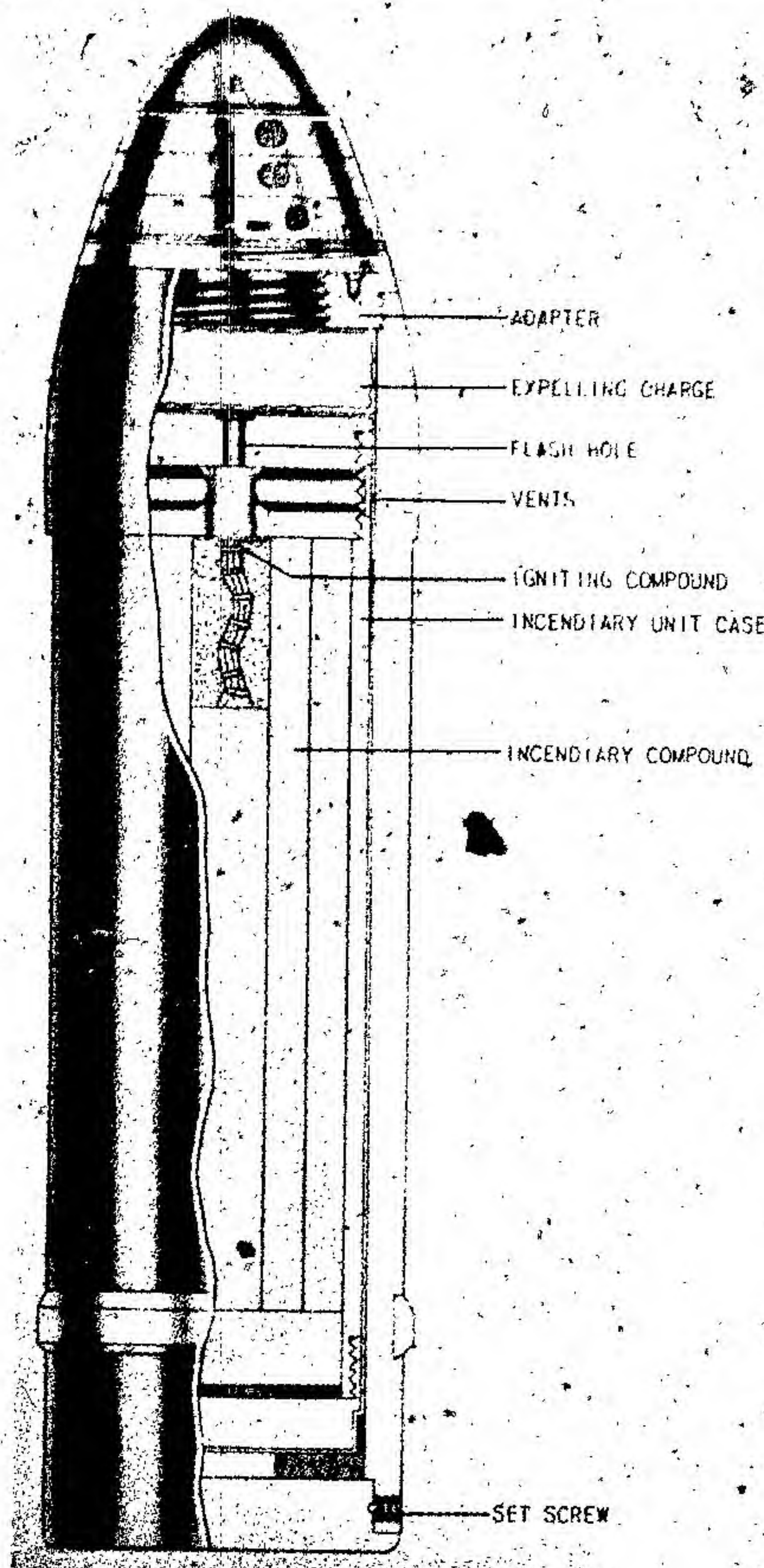



Figure 264—Type 90 7-cm Incendiary Projectile

Remarks: According to the new marking system, this projectile is painted as follows: Yellow body with the symbol  stenciled near the middle.

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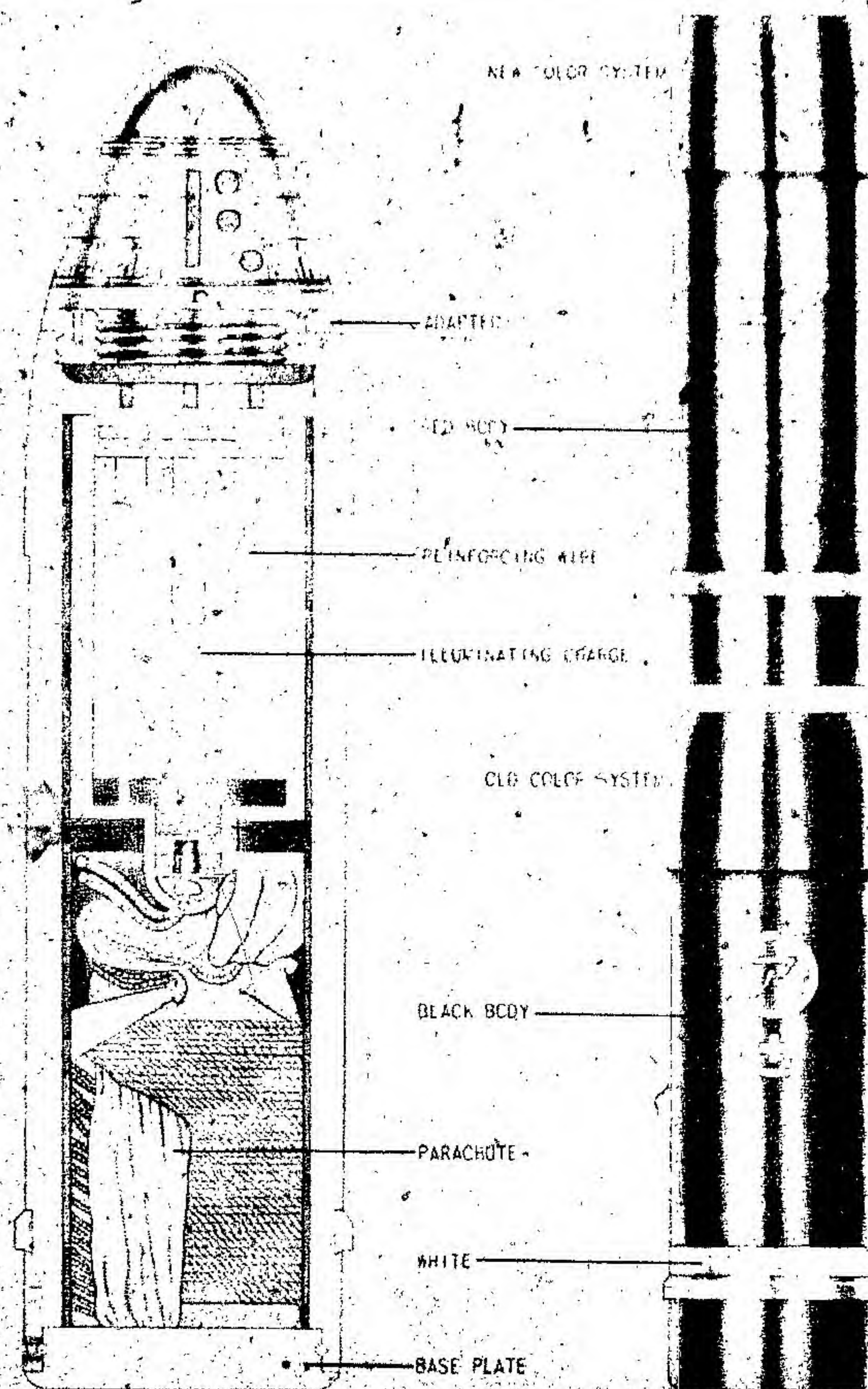


Figure 265—Type 90 7-cm Illuminating Projectile.

Type 90 7-cm (75-mm) Illuminating Projectile.

Weight of projectile, filled (fuzed): 5.65 kg. (12.44 pounds).

Weight of illuminating compound: 0.25 kg. (0.55 pound).

Filling:

Expelling charge, black powder.

Illuminating compound, not known. (A common illuminating compound used by the Japanese is a mixture of barium nitrate, magnesium and aluminum.)

Diameter at bourrelet: 75.0 mm (minus tol.).

Length over all (without fuze): No data.

Length protruding from case: 210.0 mm (8 1/4 inches).

Width of rotating band: No data.

Fuzing: Type 5th year combination fuze.

Weapons in which used:

Type 41 mountain gun: Case, 7 1/4 inches.

Type 38 field gun group: Case, 11 1/2 inches.

Type 90 field gun: Case, 16 1/2 inches.

Type 94 mountain gun: Case, 11 1/2 inches.

Remarks: 1. Japanese figures state that this illuminating charge burns with an intensity of approximately 90,000 candlepower, for a period of 20 seconds.

2. According to the new marking system, this projectile is painted as follows: Red body with the symbol \textcircled{T} stenciled near the middle. Under the old marking system, it was painted black over all with the same symbol stenciled on the body.

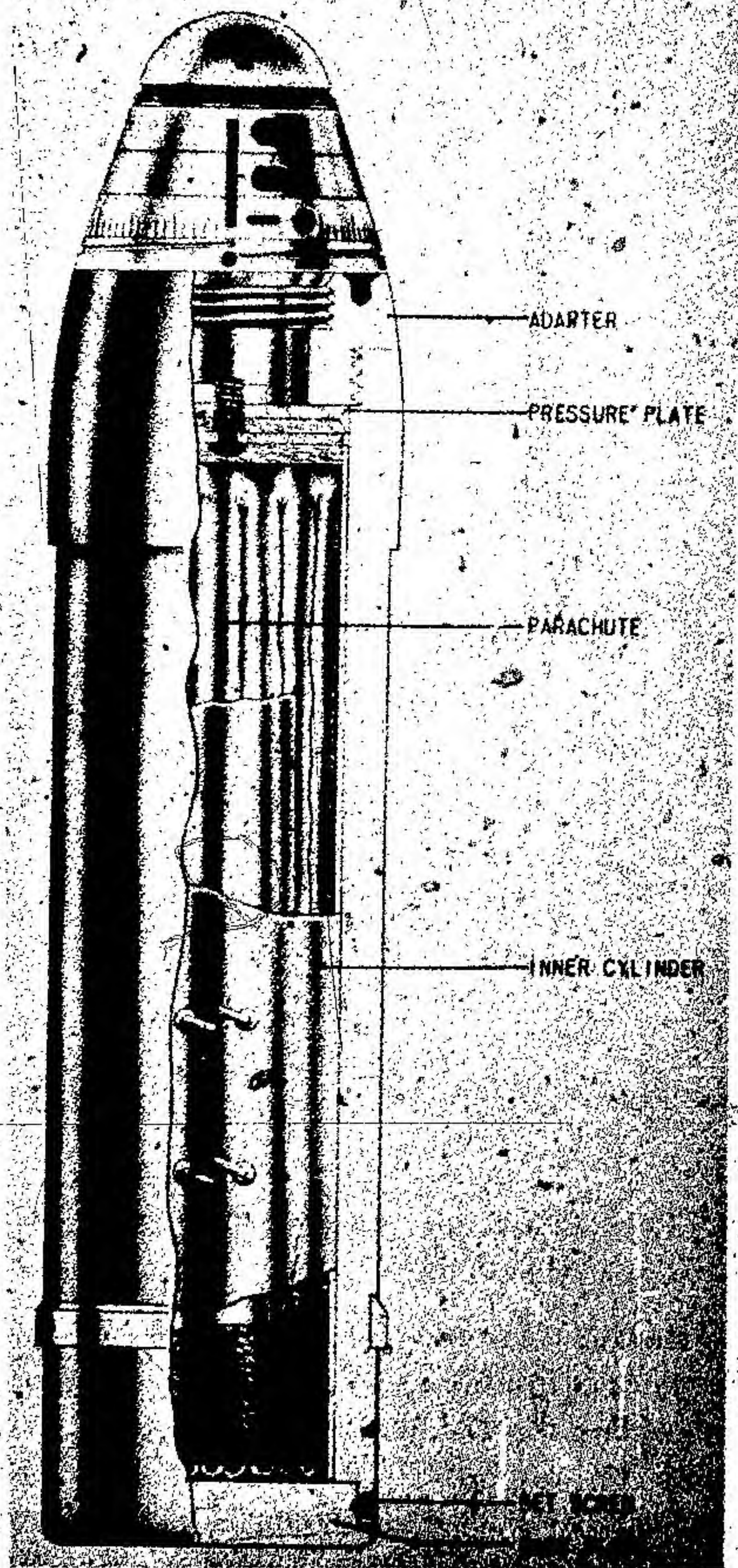


Figure 266—Type 11-Yr. 7-cm Target Projectile.

Type 11 Year 7-cm (75-mm) Target Projectile

Weight of projectile, filled (fuzed): 5.04 kg. (11.10 pounds).

Filling: Folded parachute and shrouds in cardboard cylinder.

Diameter at bourrelet: 75.0 mm (minus tol.).

Length over-all (without fuze): 271 mm (10 $\frac{1}{4}$ inches).

Length protruding from case: No data.

Width of rotating band: 10 mm.

Fuzing: Type 10th year A. A. time (weak).

Weapons in which used:

Type 11-year field A. A. gun: Case length not known.

Type 88 field A. A. gun: Case, 19 $\frac{1}{4}$ inches.

Remarks: Projectiles designated "Target" in Japanese Army nomenclature are believed to be actual parachute-suspended aerial targets for anti-aircraft practice. The drawing and the data given here are from captured documents. Though operation was not described, it is presumed that the time fuze ejects the parachute at the desired altitude and that the projectile body remains attached as a weight. The descending parachute then serves as a target for A. A. fire. No ejection charge other than the magazine charge in the fuze is indicated in the document, and the fuze is designated as "weak." It is assumed that this arrangement is intended to decrease the force of explosion to the minimum necessary to eject the parachute.

Color marking: Black body, no color bands, the symbol \textcircled{T} stencilled near the middle of the body.

7-cm (75-mm) Liquid Incendiary Projectile

Weight of projectile, filled (fuzed): 5.36 kg. (11.75 pounds).

Bursting charge: A standard 40-gram booster (fine granular picric acid in paper container) serves as the only bursting charge.

Incendiary filling: A solution of white phosphorus (W. P.) and rubber pellets in carbon disulphide (CS₂).

Liquid: 0.30 kg. (0.66 pound).

Rubber pellets: 0.32 kg. (0.70 pound).

Diameter at bourrelet: 75 mm (minus tol.).

Length over-all without fuze and adapter: 300 mm (11 $\frac{1}{4}$ inches).

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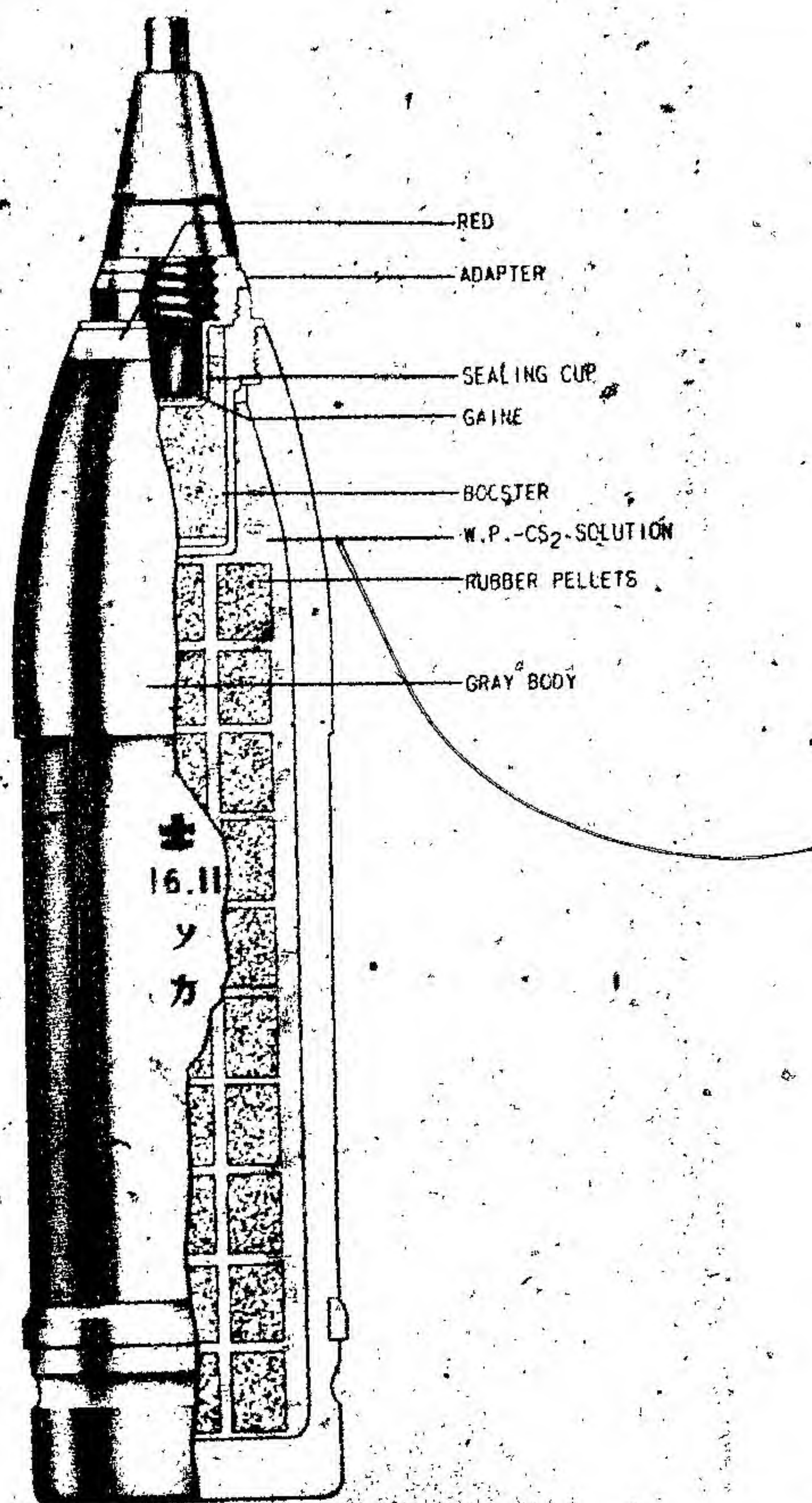


Figure 267—7-cm Liquid Incendiary Projectile.

Length protruding from case: 242 mm (9 1/2 inches).

Width of rotating band: 10 mm.

Fuzing: Type 88 instantaneous fuze (gun type).

Weapons in which used:

Type 41 mountain gun or regimental gun:
Case, 7 1/4 inches.

Type 94 mountain gun: Case, 11 1/2 inches.

Type 38 field gun group: Case, 11 1/2 inches.

Type 90 field gun: Case, 16 1/4 inches.

Remarks: Because of the danger of leaking phosphorus solution, these projectiles are shipped with a bag of clay-like, diatomaceous earth tied around the nose end. It is presumed that this is intended as an absorbent should leakage occur.

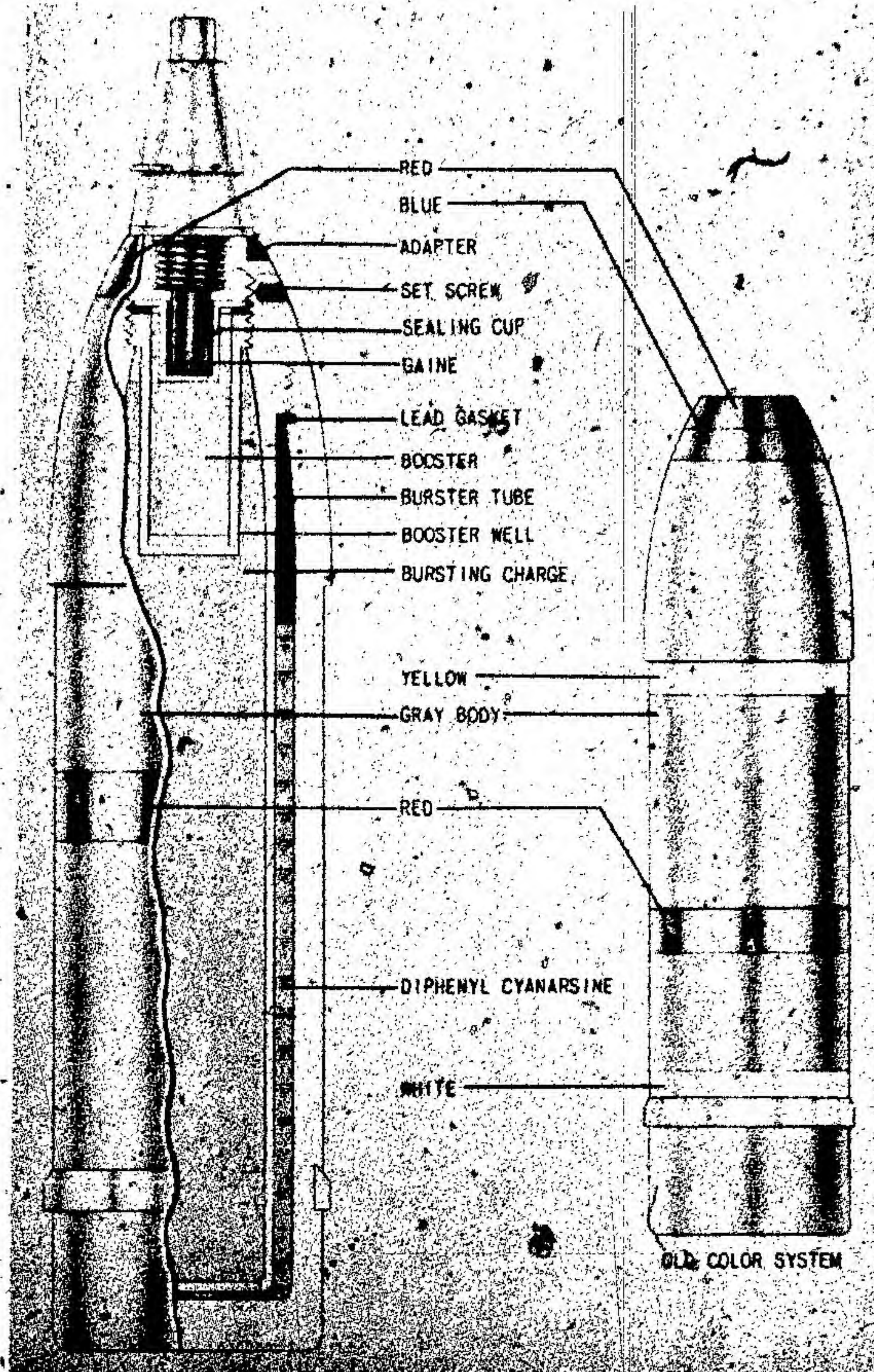


Figure 268—7-cm Vomit Gas Projectile.

7-cm (75-mm) Vomit-Gas Projectile

Weight of projectile, filled (without fuze): 6.00 kg. (13.25 pounds.)

Bursting charge. A mixture of 70 percent trinitrotoluene and 30 percent naphthalene. (Naphthalene is probably used to decrease sensitivity of TNT): 0.46 kg. (1.02 lbs.)

Liquid filling: Crude diphenylcyanarsine. 0.17 kg. (0.37 pound).

Diameter at bourrelet: 75.0 mm (minus tol.)

Length over all (without fuze): 305.0 mm (12 inches.)

Length protruding from case: 265.0 mm (10 1/2 inches.)

Width of rotating band: 9.0 mm (3/8 inch.)

Fuzing: Type 88 instantaneous fuze.

Weapon in which used: Type 41 regimental or mountain gun: Case, 7 1/4 inch.

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Type 100 8-cm (88-mm) High-Explosive-A. A. Long-Pointed Projectile

Weight of complete round: Not available.

Weight of complete projectile (with fuze): 19.6 pounds (approximate).

Weight of empty projectile (with auxiliary fuze): 7.4 kg. (16.3 pounds).

Weight of filling: 0.9 kg. (2 pounds).

Filling: TNT.

Diameter at bourrelet: 88 mm (minus tol.).

Length of projectile (without fuze): 298 mm (11 $\frac{1}{8}$ inches).

Length of propellant case: 570 mm (22 $\frac{3}{8}$ inches).

Length of assembled round (without fuze): 804 mm (31 $\frac{1}{8}$ inches).

Diameter of base of case: 100 mm (4 inches).

Width of rotating band:

Forward: 8 mm ($\frac{5}{16}$ inch).

Aft: 8 mm ($\frac{5}{16}$ inch).

Distance between rotating bands: 6 mm ($\frac{1}{4}$ inch).

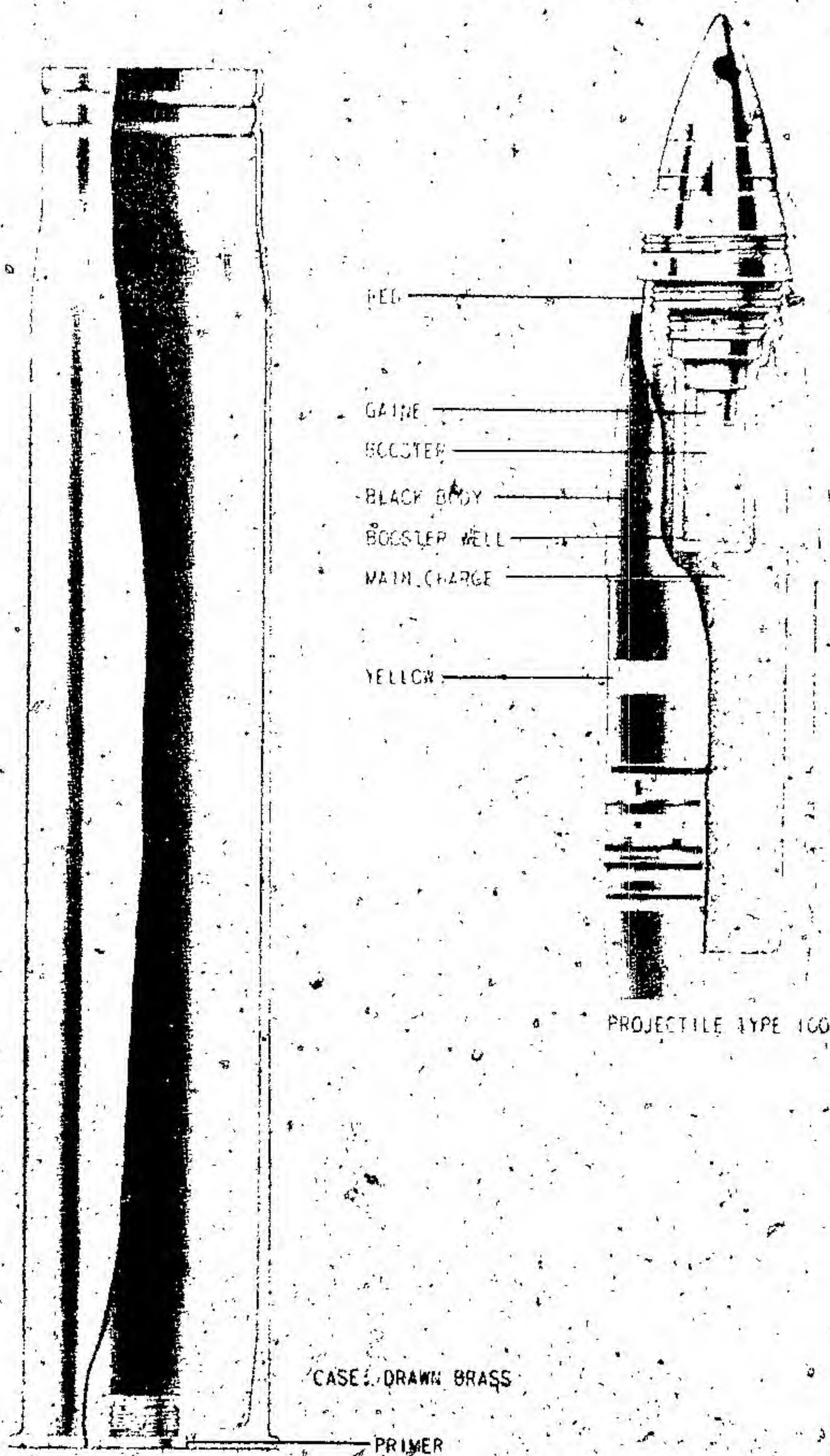


Figure 269—Type 100 8-cm High-Explosive Antiaircraft Long-Pointed Projectile.

Fuzing: Type 100 mechanical time fuze (combination time and impact) with an auxiliary detonating fuze. The auxiliary fuze is the same as that used in the 7-cm (75-mm) H. E. A. A. projectile type 90.

Weapons in which used: Type 99 8-cm A. A. gun. This is a gun modeled after one of the German 88 mm guns.

Case:

Length: 567 mm (22 $\frac{3}{4}$ inches).

Diameter at base: 137 mm (4 $\frac{3}{4}$ inches).

The case is made of drawn brass and is machined for about 2 $\frac{1}{4}$ inches above the rim. It is a rimmed case with a slight taper and a bottleneck.

Propellant: No. 16 cylindrical, 2,330 grams (5.1 pounds.)

9-cm (90-mm) High-Explosive Projectile

Weight of projectile, filled: 7.79 kg. (17.13 pounds).

Weight of filling: 0.59 kg. (1.3 pounds).

Filling: Crude TNT.

Diameter at bourrelet: 90 mm (3 $\frac{1}{2}$ inches).

Length over all (without fuze): 265.1 mm (10 $\frac{1}{2}$ inches).

Length of projectile body (without nose piece): 209.6 mm (8 $\frac{1}{4}$ inches).

Length protruding from case (without fuze): 246.1 mm (9 $\frac{1}{2}$ inches).

Width of Rotating Band: No data.

Fuzing:

Type 88 instantaneous nose fuze (howitzer-mortar type).

Type 88 short-delay nose fuze (howitzer-mortar type).

Weapon in which used: This is an antiquated weapon classified as a mortar by the Japanese by virtue of length of tube, muzzle velocity, etc., but bearing only a remote resemblance to other Japanese mortars.

It is breech-loading, using an interrupted thread breechblock, and employs projectiles embodying the conventional features of design of common breech-loading artillery pieces.

Remarks: The body of this projectile is painted black over-all. There is a shallow groove immediately below the bourrelet which may be painted yellow or green.

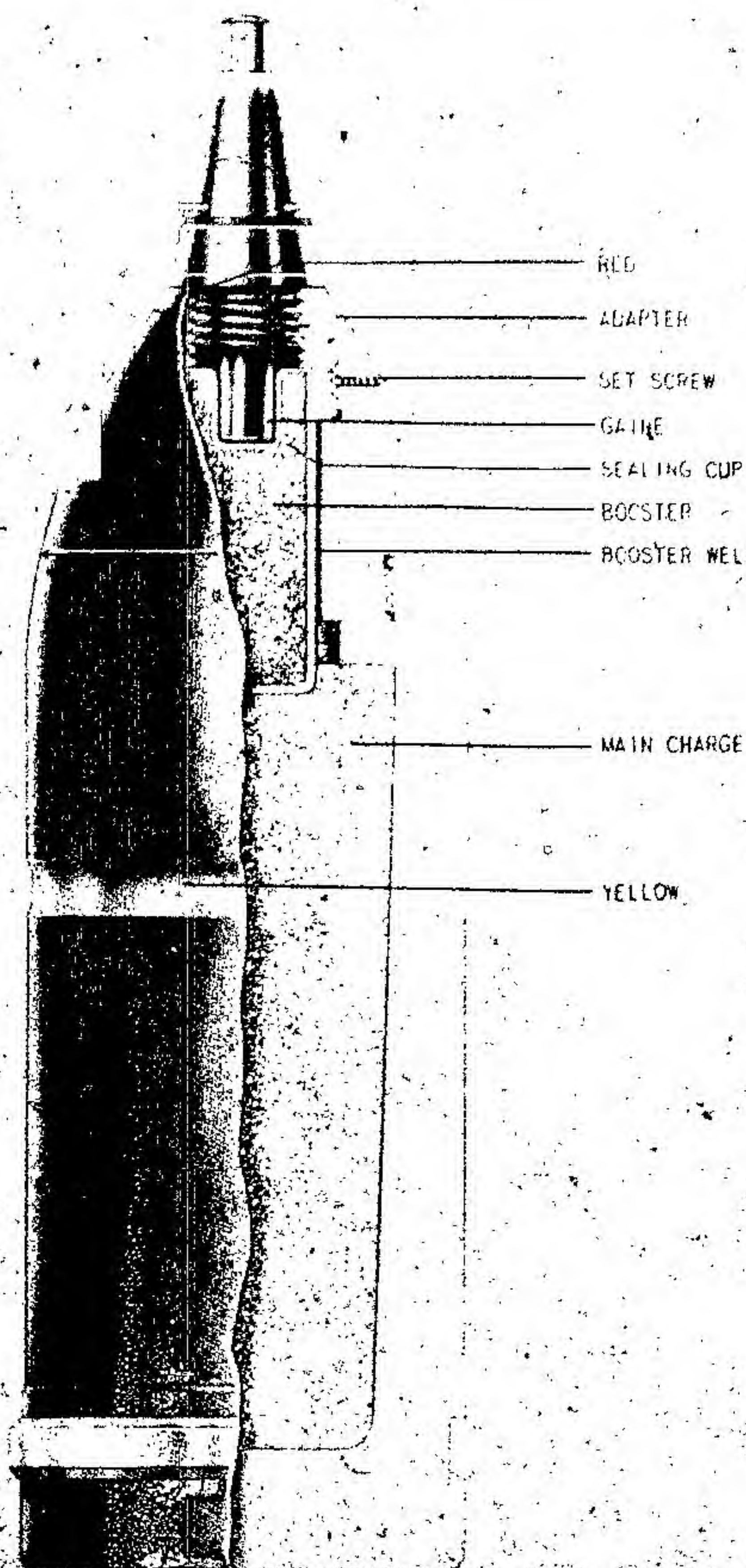


Figure 270—9-cm High-Explosive Projectile.

9-cm (90-mm) High-Explosive Semisteel Projectile

Weight of projectile, filled: 7.86 kg. (17.3 pounds).

Weight of filling: 0.65 kg. (1.42 pounds).

Filling: TNT.

Diameter at bourrelet: 90 mm (3 $\frac{1}{2}$ inches).

Length over all (without fuze): 263.5 mm (10 $\frac{1}{2}$ inches).

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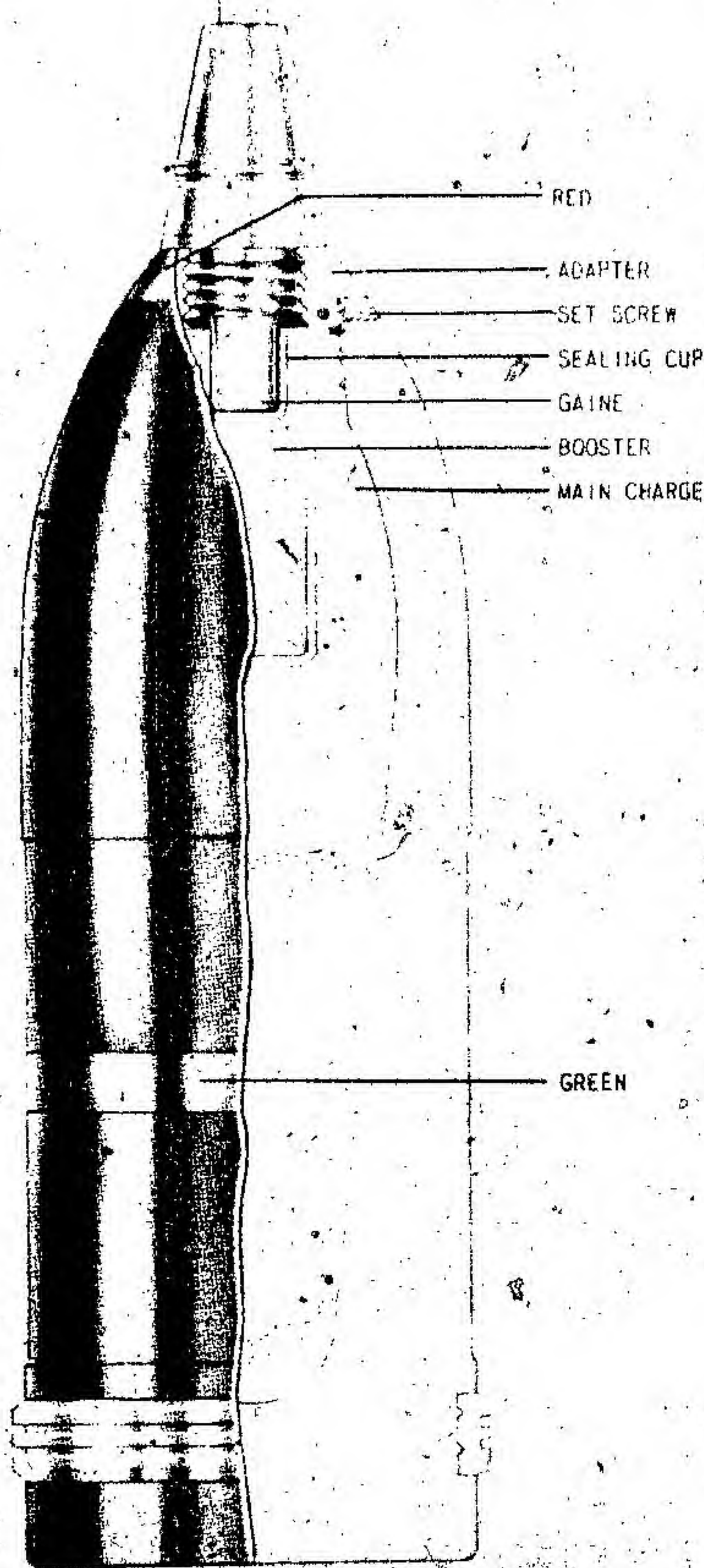


Figure 271—9-cm High-Explosive Semi-Steel Projectile.

Length protruding from case (without fuze):
246.1 mm (9 $\frac{1}{16}$ inches).

Width of rotating band: 15.9 mm ($\frac{5}{8}$ inch).

Fuzing:

Type 88 instantaneous nose fuze (howitzer-mortar type).

Type 88 short delay nose fuze (howitzer-mortar type).

Weapon in which used: This is an antiquated weapon classified as a mortar by the Japanese

by virtue of length of tube, muzzle velocity, etc., but bearing only a remote resemblance to other Japanese mortars. It is breech-loading, using an interrupted thread breechblock, and employing projectiles embodying the conventional features of design of common breech-loading artillery pieces.

Remarks: The projectile is painted black overall, with a $\frac{1}{2}$ inch green or yellow band before the rotating band. The fuze adapter is painted red.

10-cm (105-mm) Ammunition

There are three 105-mm howitzers and four 105-mm guns in use by the Japanese Army. These guns are designated 10-cm by the Japanese but have an actual bore diameter of 105 mm.

The projectiles are in most cases interchangeable for use in all these weapons and are assembled with different size cases for use in the different

weapons. Only one weapon, the type 14-year A. A. gun uses fixed ammunition, all the other weapons using semifixed ammunition.

In this section the cases and projectiles will be treated separately as was done with 75-mm ammunition.

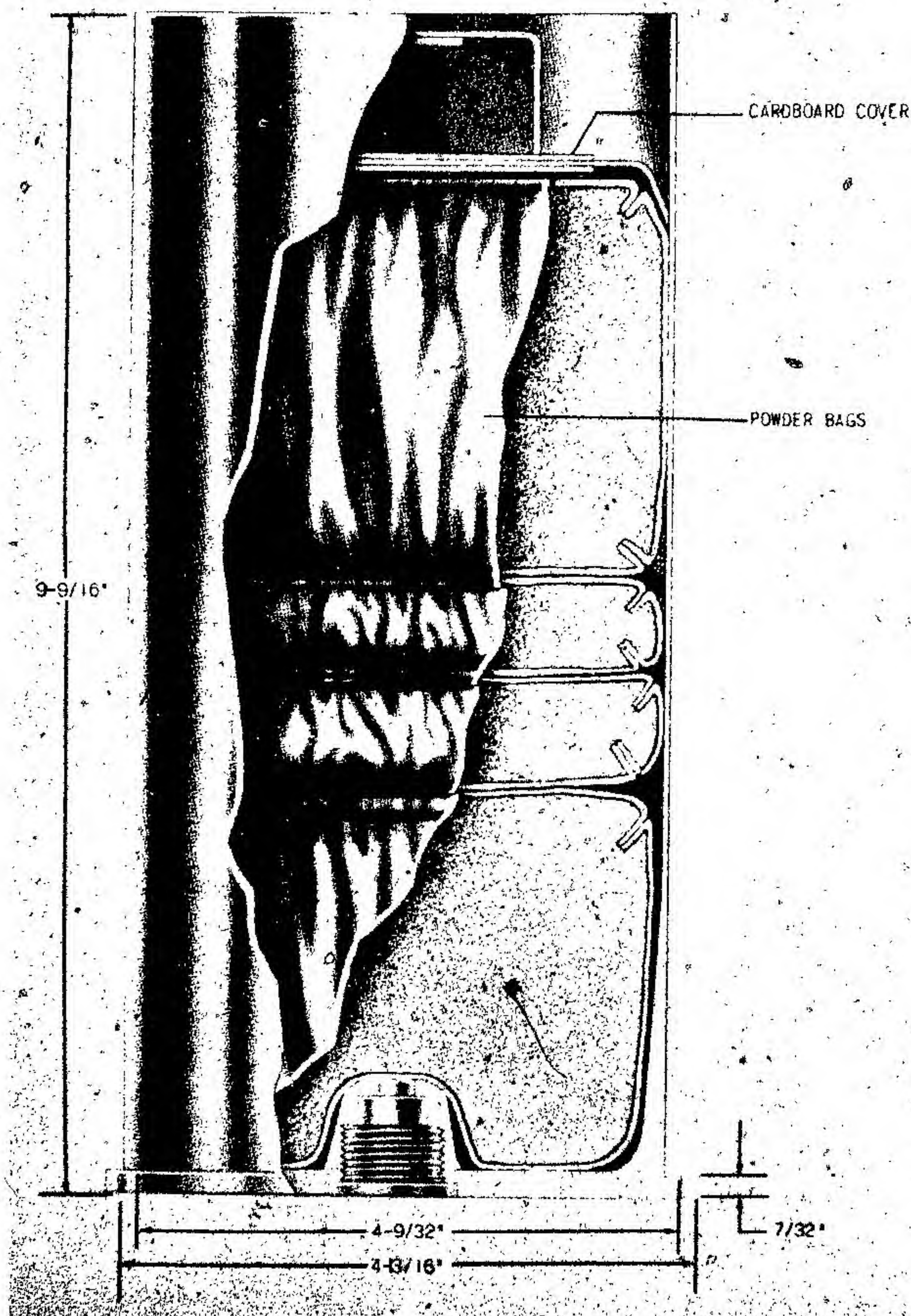


Figure 272—10-cm Ammunition.

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PROPELLANT CHARGES USED FOR VARIOUS WEAPONS

Weapon	Type of propellant	Weight of propellant (kg.)	Number of increments	Weight of increments
Type 14-year howitzer	Mk 1 square grain, Mk 3 strip	0.430	3	A 190 g. B 100 g. C 190 g.
Type 91 howitzer	Mk 2 square grain	1.135	4	A 426 g. B 105 g. C 161 g. D 443 g.
Improved type 14-year howitzer	Mk 2 square grain	.692	3	A 426 g. B 106 g. C 161 g.
Type 92 gun	Mk 3 strip	4.000	2	A 2.5 kg. B 1.5 kg.
Type 14-year gun	Mk 3 strip	2.535	2	A 2.235 kg. B 0.300 kg.
Type 38 gun	Mk 2 strip	1.740	1	1.740.
Type 14-year A. A. gun	Mk 3 strip	3.075	1	3.075.

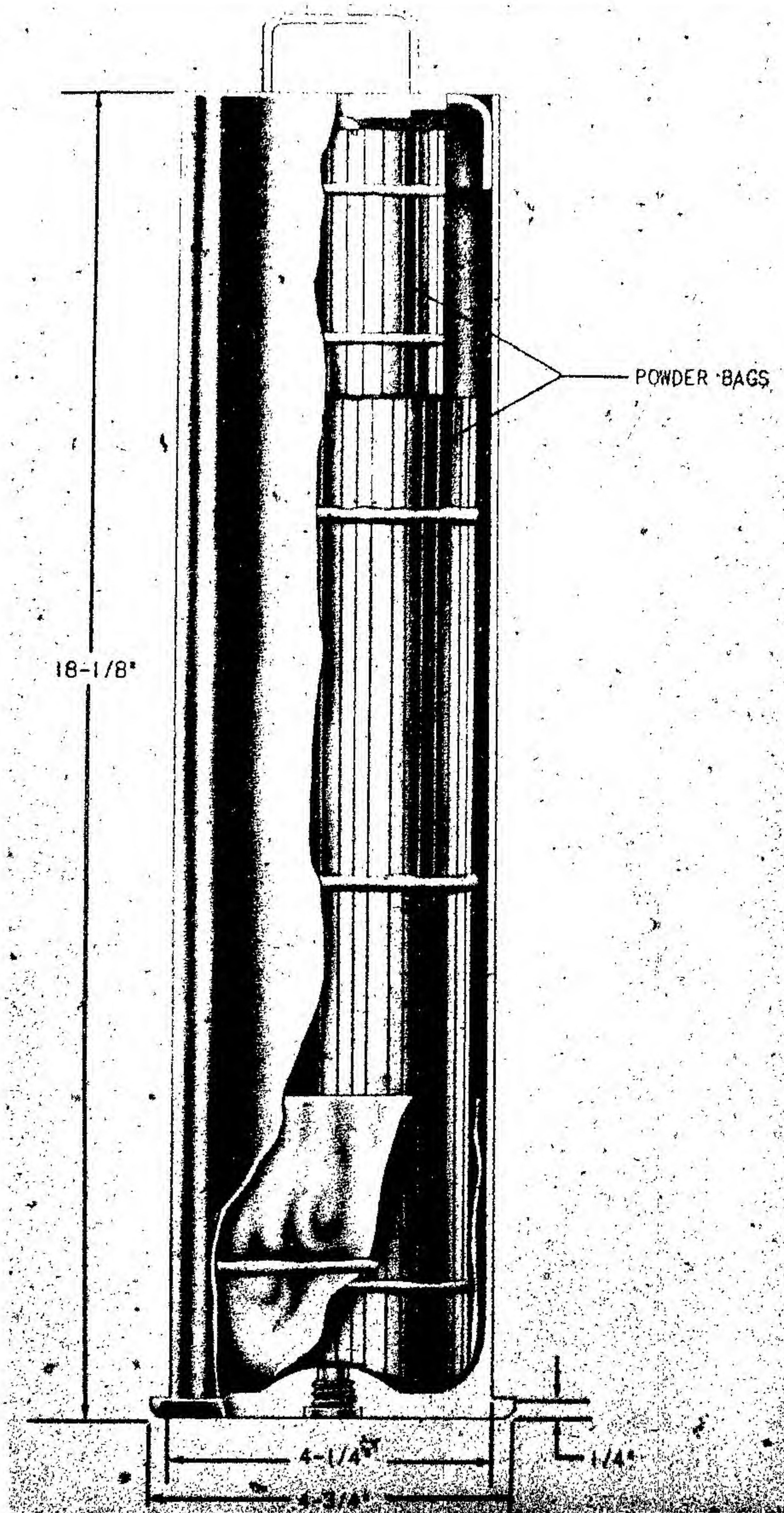


Figure 273—105-mm Type 14th-Year Gun Case.

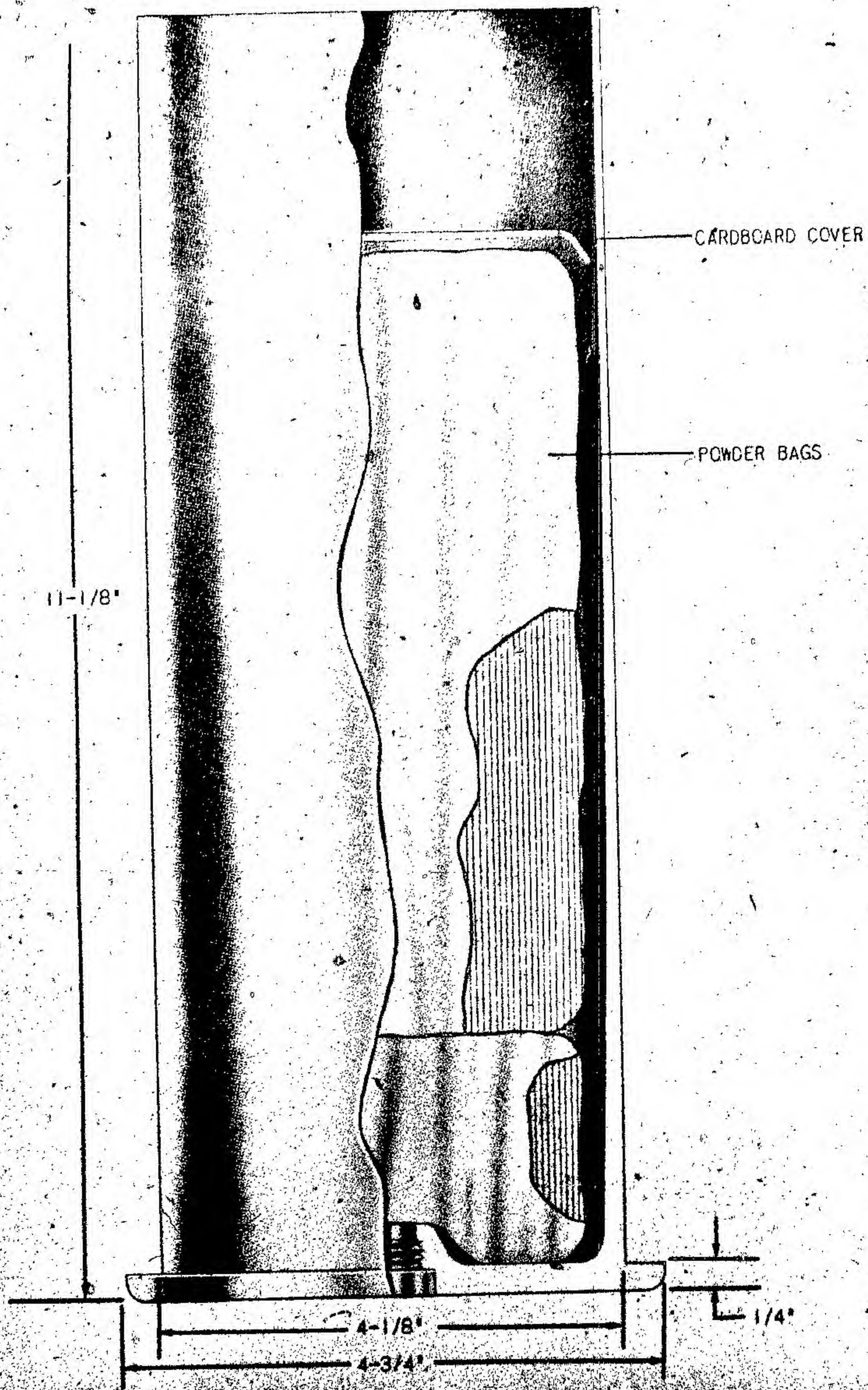


Figure 274—10-cm Ammunition.

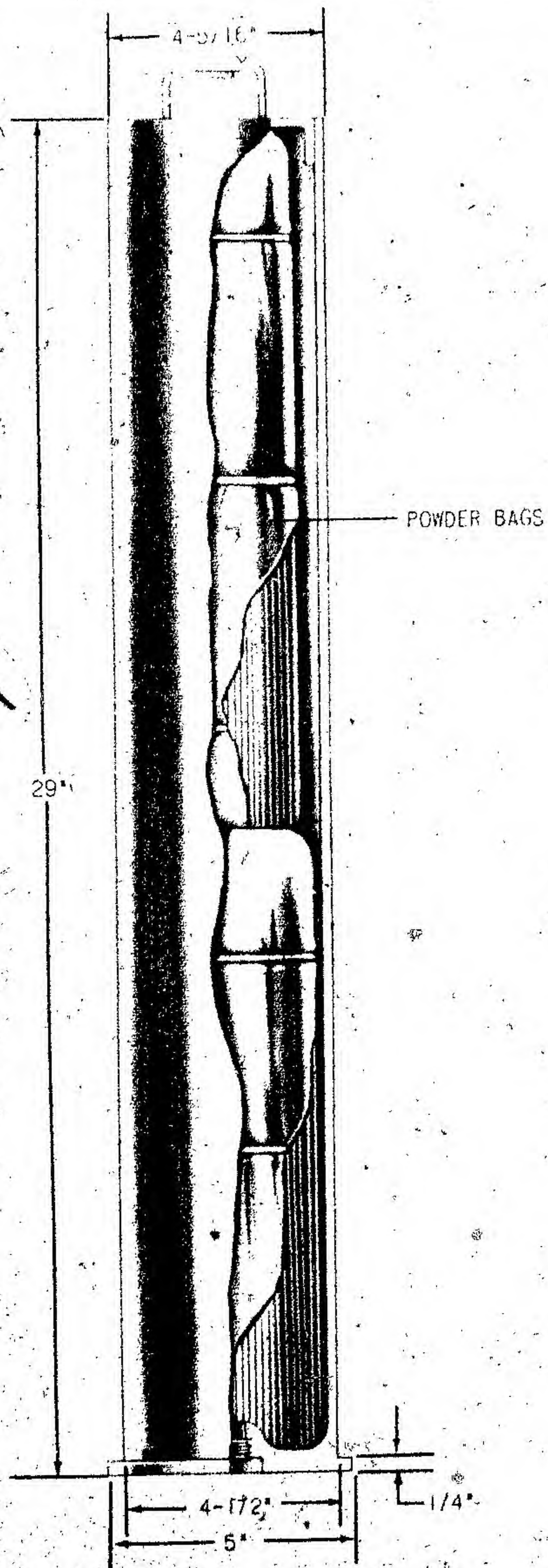


Figure 275—105-mm Type 92 Gun Case.

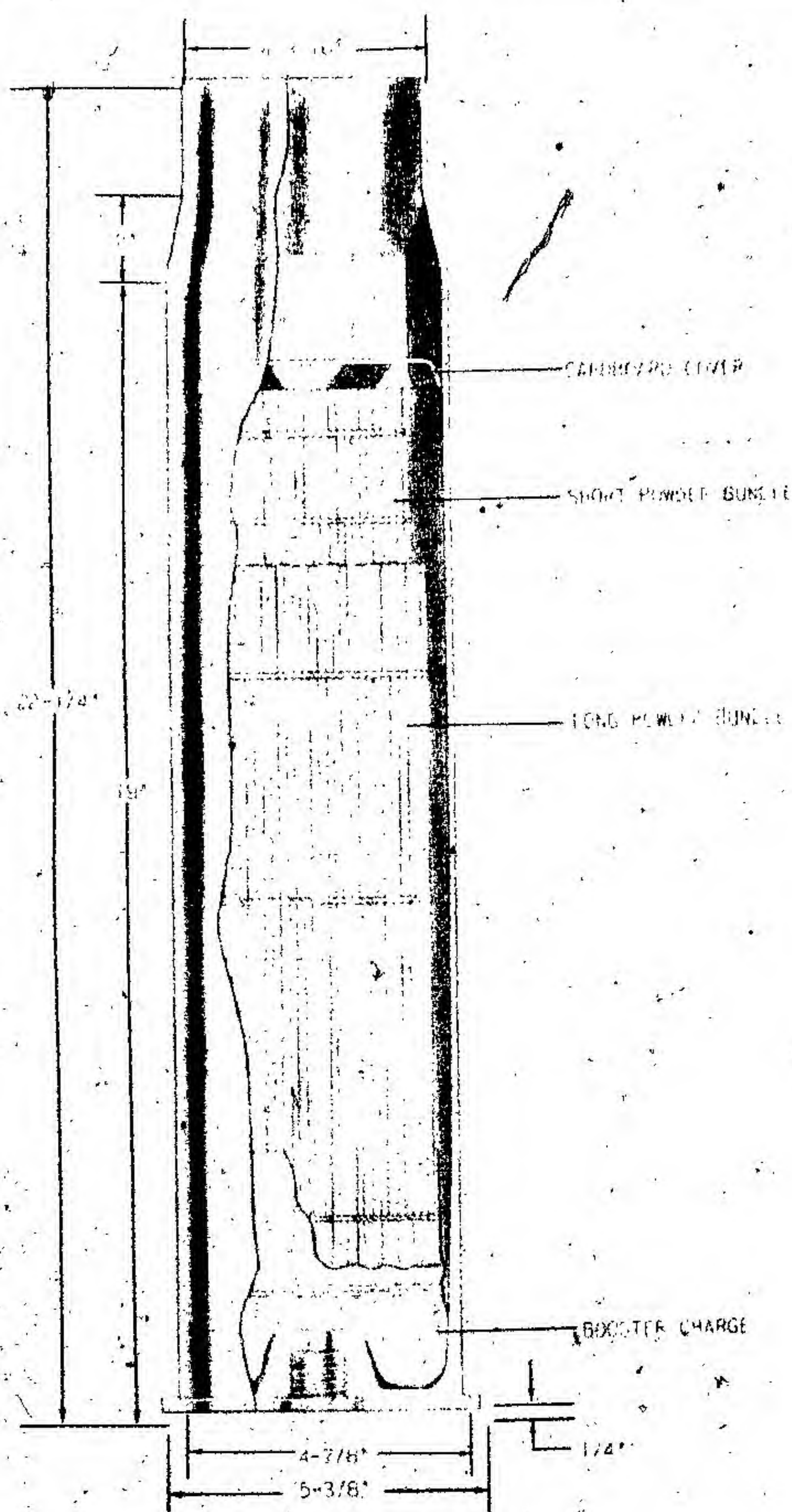


Figure 276—10-cm Ammunition.

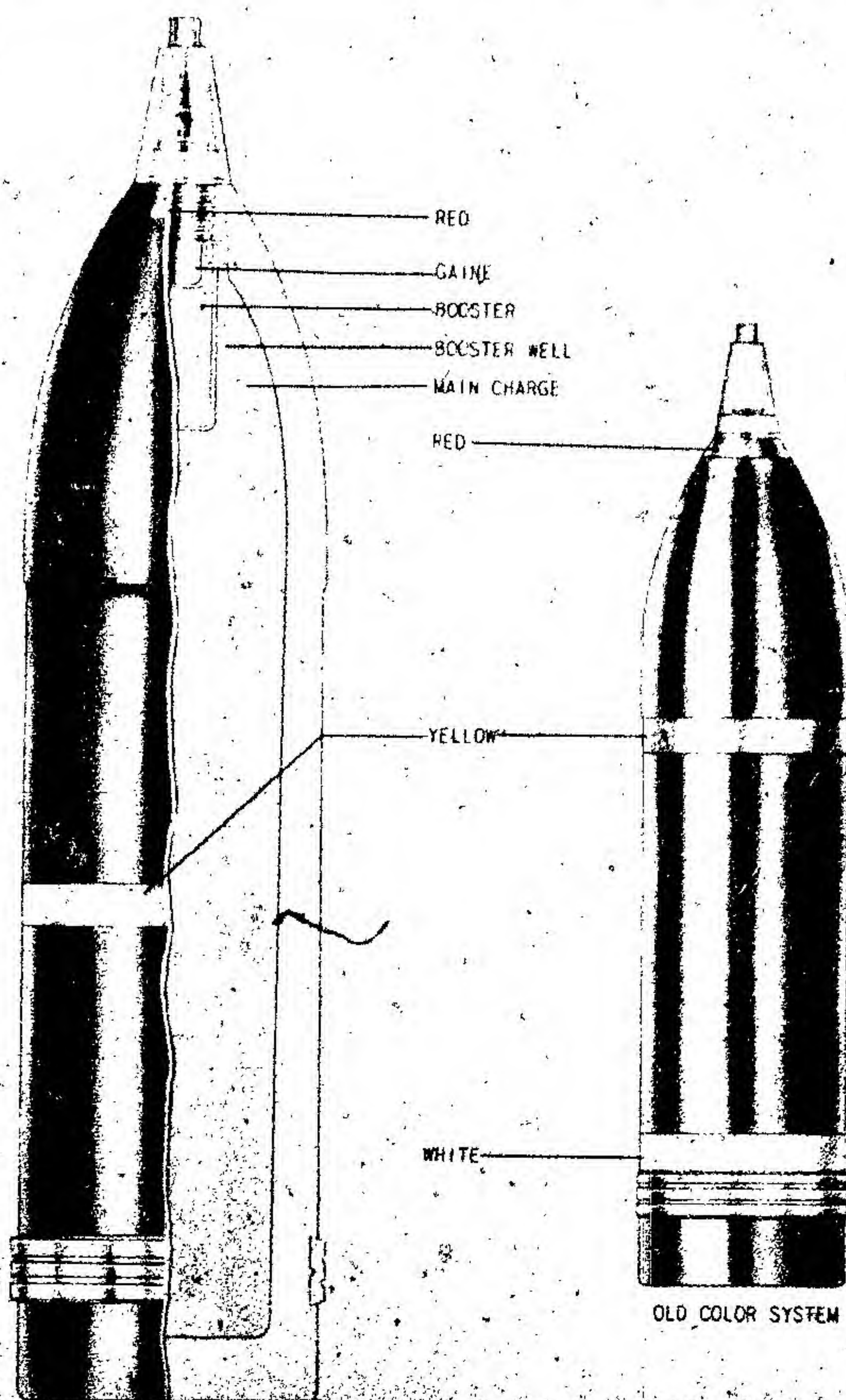


Figure 277—Type 91 10-cm High-Explosive Projectile.

Type 91 10-cm (105-mm) High-Explosive Projectile

Width of rotating band: 22.2 mm ($\frac{7}{8}$ inch).

Fuzing:

Type 88 instantaneous nose fuze.

Type 88 short-delay nose fuze.

Weapons in which used:

Type 91 howitzer: Case, 9 $\frac{1}{2}$ inches.

Type 38 field gun: Case, 11 $\frac{1}{8}$ inches.

Type 92 field gun: Case, 29 inches.

Type 14-year field gun: Case, 18 $\frac{1}{8}$ inches.

Weight of projectile, filled (without fuze): 15.9 kg. (35.06 pounds).

Weight of filling: 2.3 kg. (5 pounds).

Filling: Cast TNT.

Diameter at bourrelet: 104 mm (4 $\frac{1}{2}$ inches).

Length over all (without fuze): 427 mm (16 $\frac{1}{8}$ inches).

Length protruding from case (without fuze): 389.7 mm (15 $\frac{1}{2}$ inches).

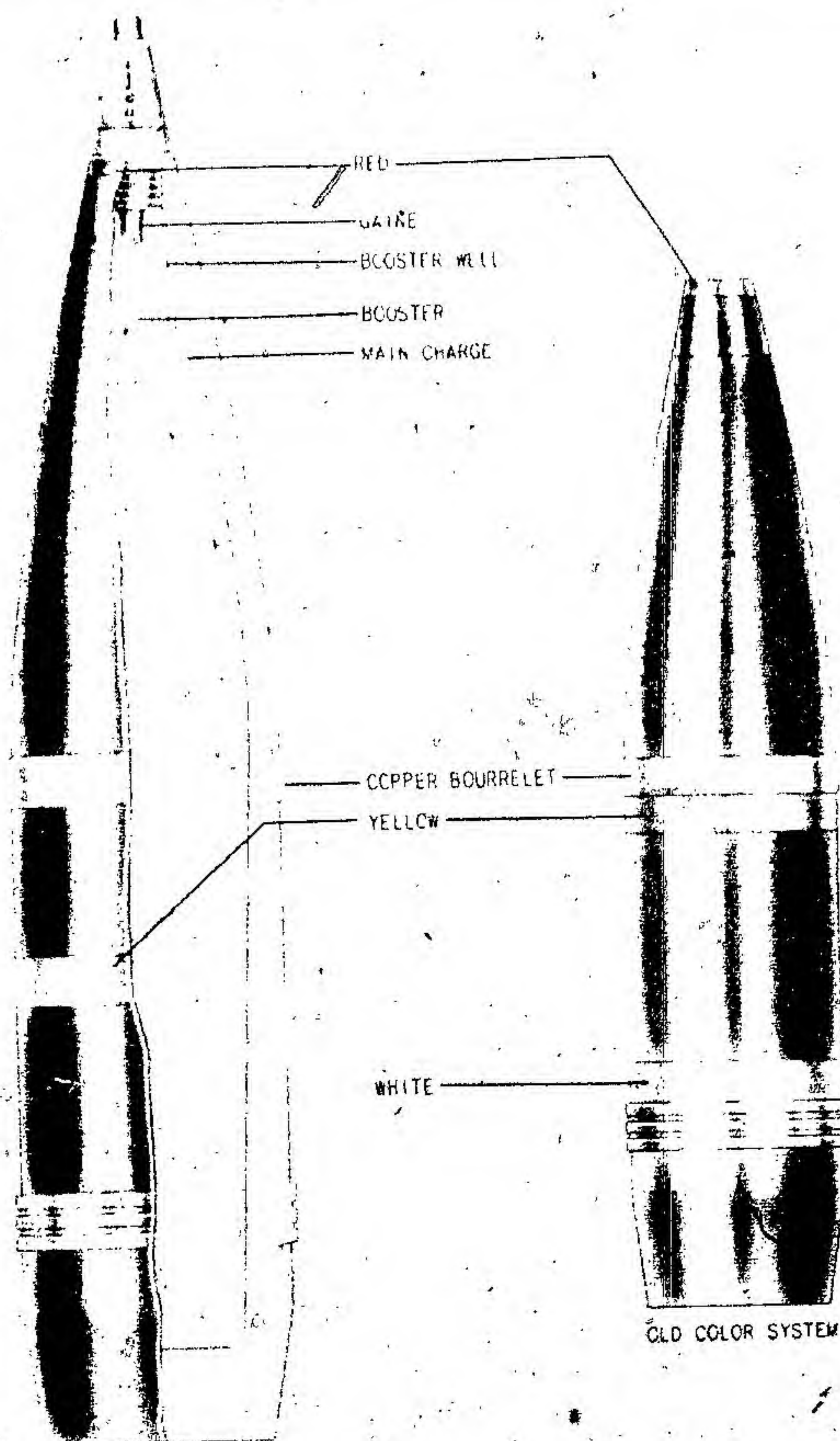


Figure 278—Type 91 10-cm High-Explosive Long-Pointed Projectile.

Type 91 10-cm (105-mm) High-Explosive Long-Pointed Projectile

Weight of projectile, filled (without fuze): 15.7 kg. (34.5 pounds).

Weight of filling (white composition): 2.3 kg. (5.2 pounds).

Filling:

1. Cast TNT.
2. White composition of ammonium nitrate, cyclonite, and guanidine nitrate.

Diameter at copper bourrelet: 104.2 mm (4 1/8 inches).

Length over all (without fuze): 501.7 mm (19 3/4 inches).

Length protruding from case (without fuze): 423.9 (16 1/2 inches).

Width of rotating band: 22.2 mm (7/8 inch).

Width of copper bourrelet: 20.6 mm (1 1/8 inch).

Fuzing:

Type 88 instantaneous nose fuze.

Type 88 short delay nose fuze.

Weapons in which used:

- Type 91 howitzer: Case, 9½ inches.
- Type 38 field gun: Case, 11½ inches.
- Type 14-year field gun: Case, 18½ inches.
- Type 92 field gun: Case, 20 inches.

Type 14-year A. A. gun (fixed ammunition):
Case, 22¼ inches.

Remarks: This projectile has been recovered with either a copper or a machined bourrelet.

12-cm (120-mm) Shrapnel Projectile

Weight of projectile, filled (without fuze): 19.88 kg. (43.75 pounds).

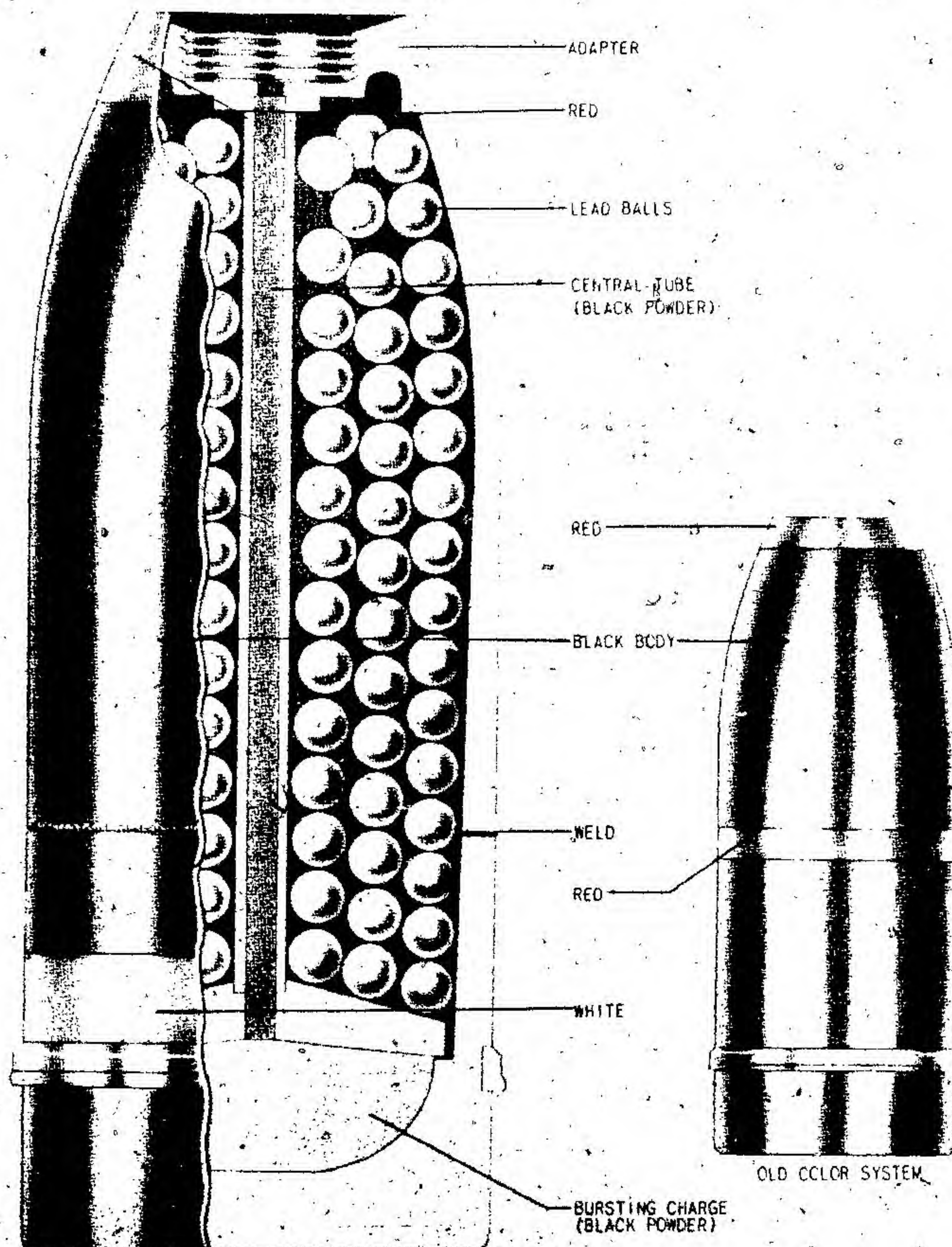


Figure 279—12 cm-Shrapnel Projectile.

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Ejecting charge: Black powder contained in the base of the projectile and in a central brass tube.

Shrapnel filling: 539 lead balls (12.5 grams each) packed in a rosin matrix. The balls are separated from the ejection charge by a steel disc which rests on a shoulder in the projectile cavity.

Diameter at bourrelet: 119 mm (4 $\frac{1}{16}$ inches).

Length over-all (without fuze): 314.3 mm (12 $\frac{1}{2}$ inches).

Length protruding from case (without fuze): 293.1 mm (10 $\frac{1}{4}$ inches).

Width of rotating band: 9.5 mm ($\frac{3}{8}$ inches).

Fuzing: Type 88 35-second combination fuze.

Weapons in which used: Type 38 howitzer.

Case:

Length: 83 mm (3 $\frac{1}{8}$ inches).

Diameter of base: 128 mm (5 $\frac{1}{8}$ inches).

Weight (empty): 3 pounds 4 $\frac{1}{2}$ ounces.

The brass case is straight sided and of the rimmed type.

Propellant: The propellant is in two increments, each encased in a silk bag with a small ignition charge sewed to the bottom of each bag. The first increment is nitrocellulose in $\frac{5}{16}$ inch square flakes and the second increment is nitrocellulose in $\frac{1}{16}$ inch square flakes.

Weight of propellant:

1st increment: 11 ounces.

2d increment: 6 $\frac{3}{4}$ ounces.

12-cm. (120-mm) Armor Piercing-High-Explosive Projectile

Weight of projectile, filled (fuzed): 20 kg. (44 pounds).

Weight of filling: 1.3 kg. (2.9 pounds).

Filling: Picric acid.

Diameter at bourrelet: 119 mm (4 $\frac{1}{16}$ inches).

Length over-all: 379.4 mm (14 $\frac{15}{16}$ inches).

Length protruding from case: 339.7 mm (13 $\frac{3}{8}$ inches).

Width of rotating band: 11.1 mm ($\frac{7}{16}$ inch).

Fuzing: Type 88 small base fuze (howitzer, mortar type).

Case: Refer to the shrapnel projectile.

Propellant: Refer to the shrapnel projectile.

Weapons in which used: Type 38 howitzer.

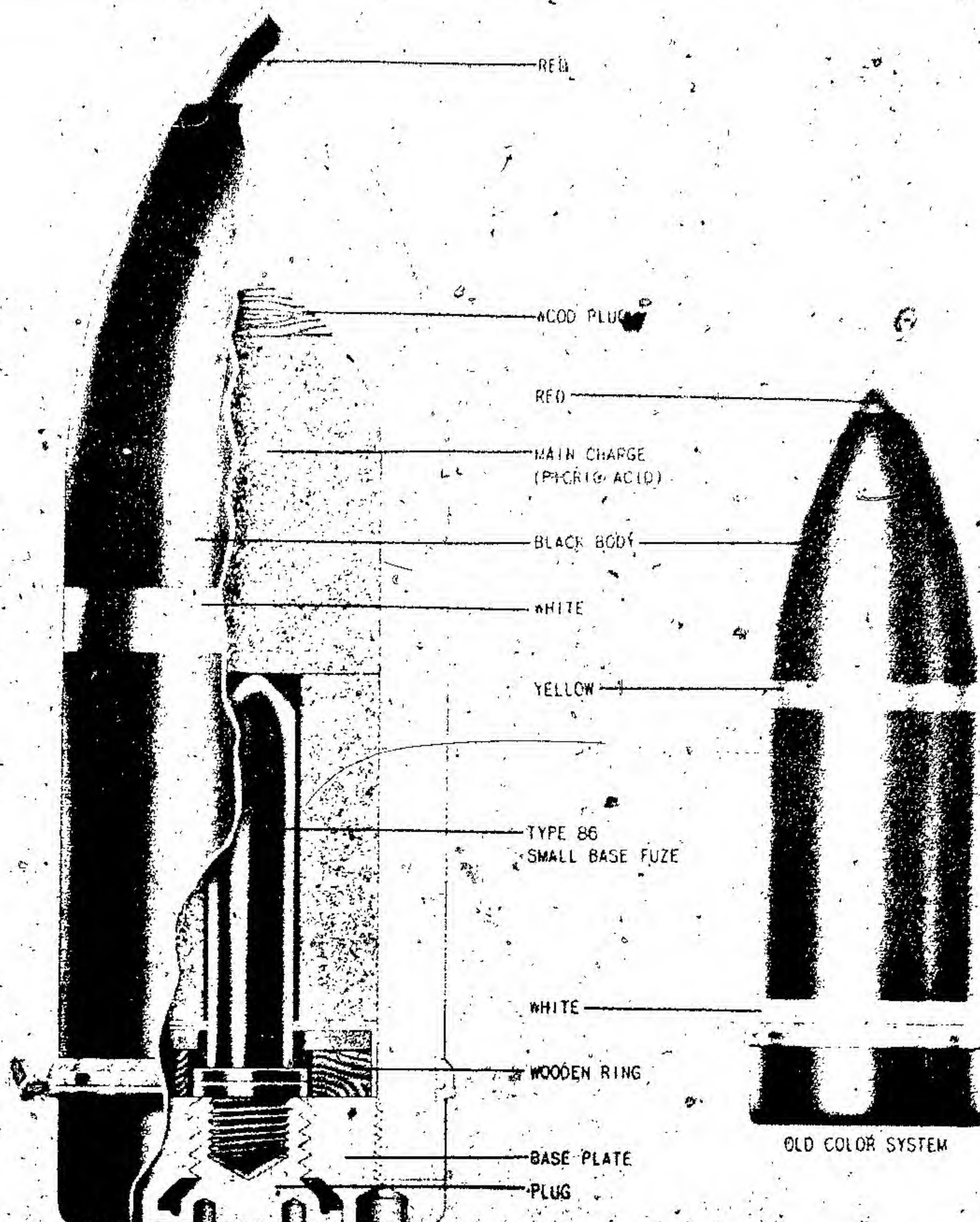


Figure 280—12-cm Armor-Piercing High-Explosive Projectile.

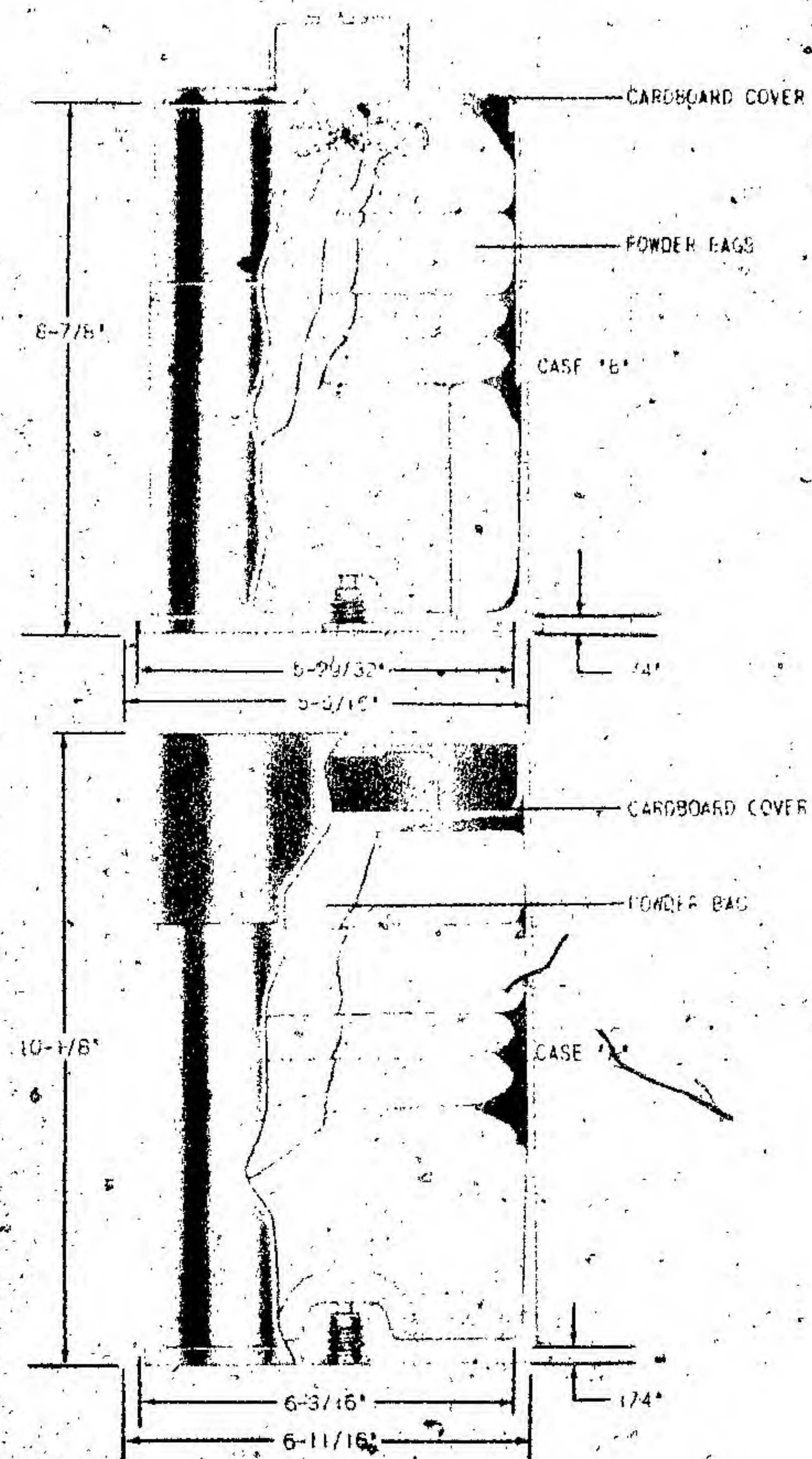


Figure 281—15-cm Ammunition.

15-cm (150-mm) Ammunition

There are three 150-mm howitzers and four 150-mm guns in use by the Japanese Army. These weapons vary greatly in design from a very short-range howitzer to long-range field guns.

The projectiles for 150-mm ammunition are not as interchangeable as in the 75-mm or 105-mm sizes. Usually there is one type of projectile designed for use in the howitzers and another type designed for use in the guns. Even when the same projectile is used in both howitzers and guns,

it will differ in that it will have a single rotating band when it is used in a howitzer, but when used in a gun it will have a double rotating band.

All the weapons with the exception of the type 89 gun, which uses a bag charge, use semifixed ammunition.

The cases and projectiles will be treated separately, as was done with 75-mm and 105-mm ammunition.

PROPELLANT CHARGES USED FOR VARIOUS WEAPONS

Weapon	Type of propellant	Weight of propellant (kg.)	Number of increments	Weight of increments
Type 4-year howitzer	Mk 2 square grain	2.260	5	A 865 g. B 255 g. C 255 g. D 445 g. E 440 g.
Type 38 Howitzer	Mk 1 square grain	.825	2	A 500 g. B 325 g.
Type 96 howitzer	Mk 2 square grain	2.930	5	A 980 g. B 280 g. C 440 g. D 520 g. E 710 g.
Type 45 gun Type 7-year gun Type 90 gun	Mk 5 strip	16.650	3	A 5.50 kg. B 5.50 kg. C 5.50 kg.
Type 89 gun	Mk 4 strip	9.700	2	A 8.00 kg. B 1.70 kg.

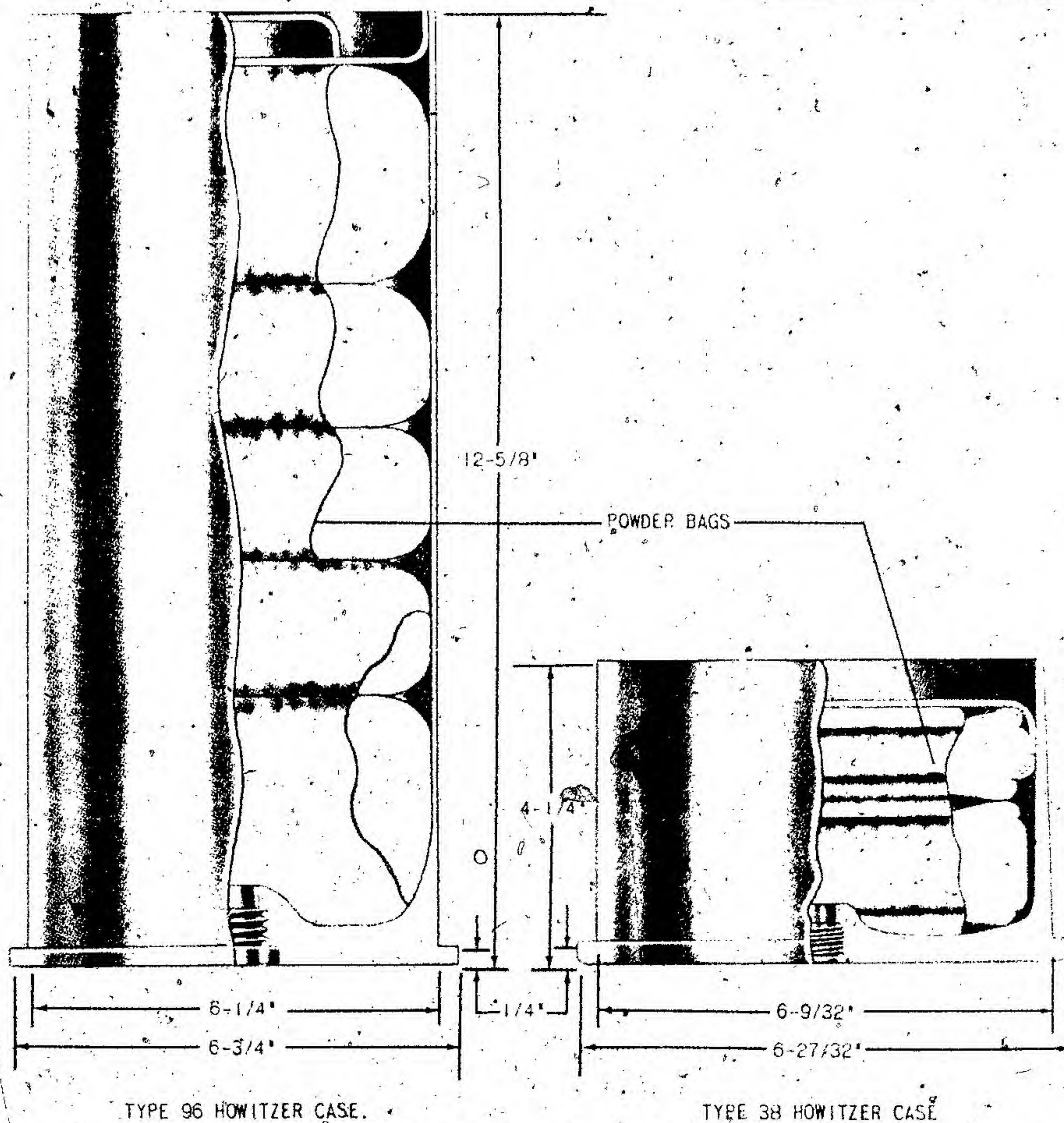


Figure 282—150-mm Type 38 Howitzer Case.

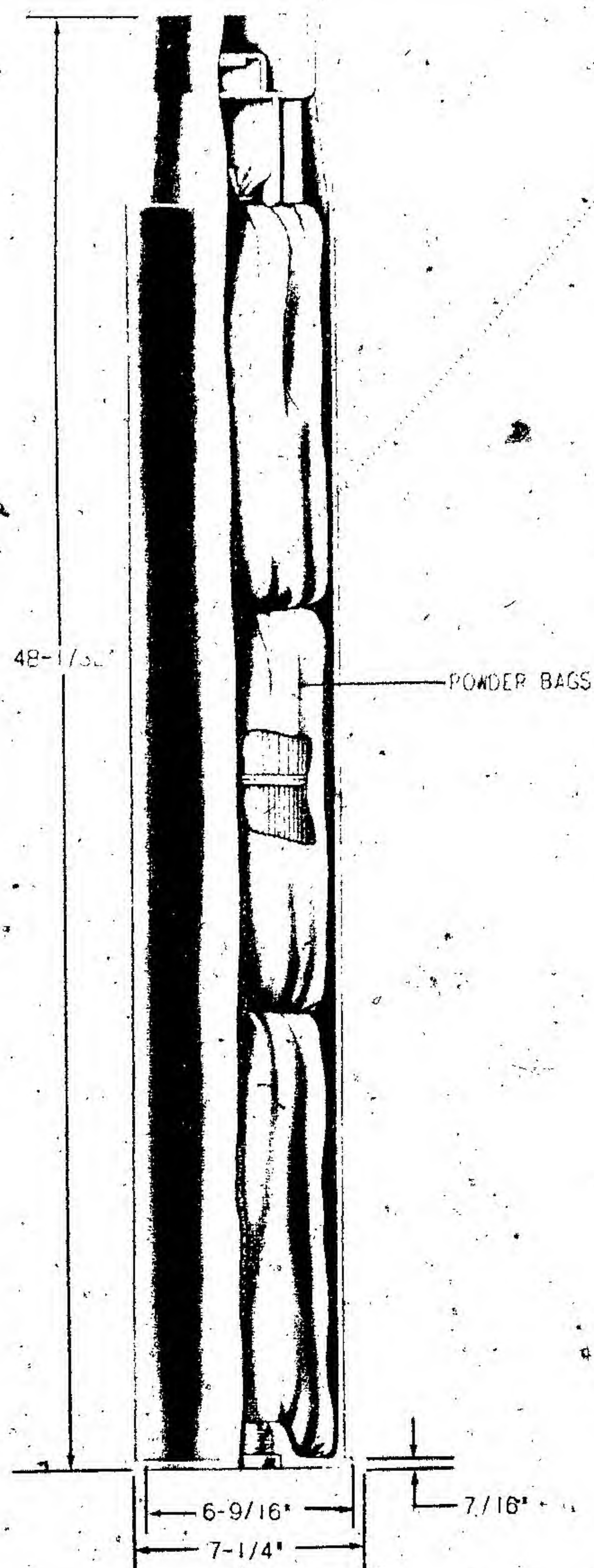


Figure 283—15-cm Ammunition.

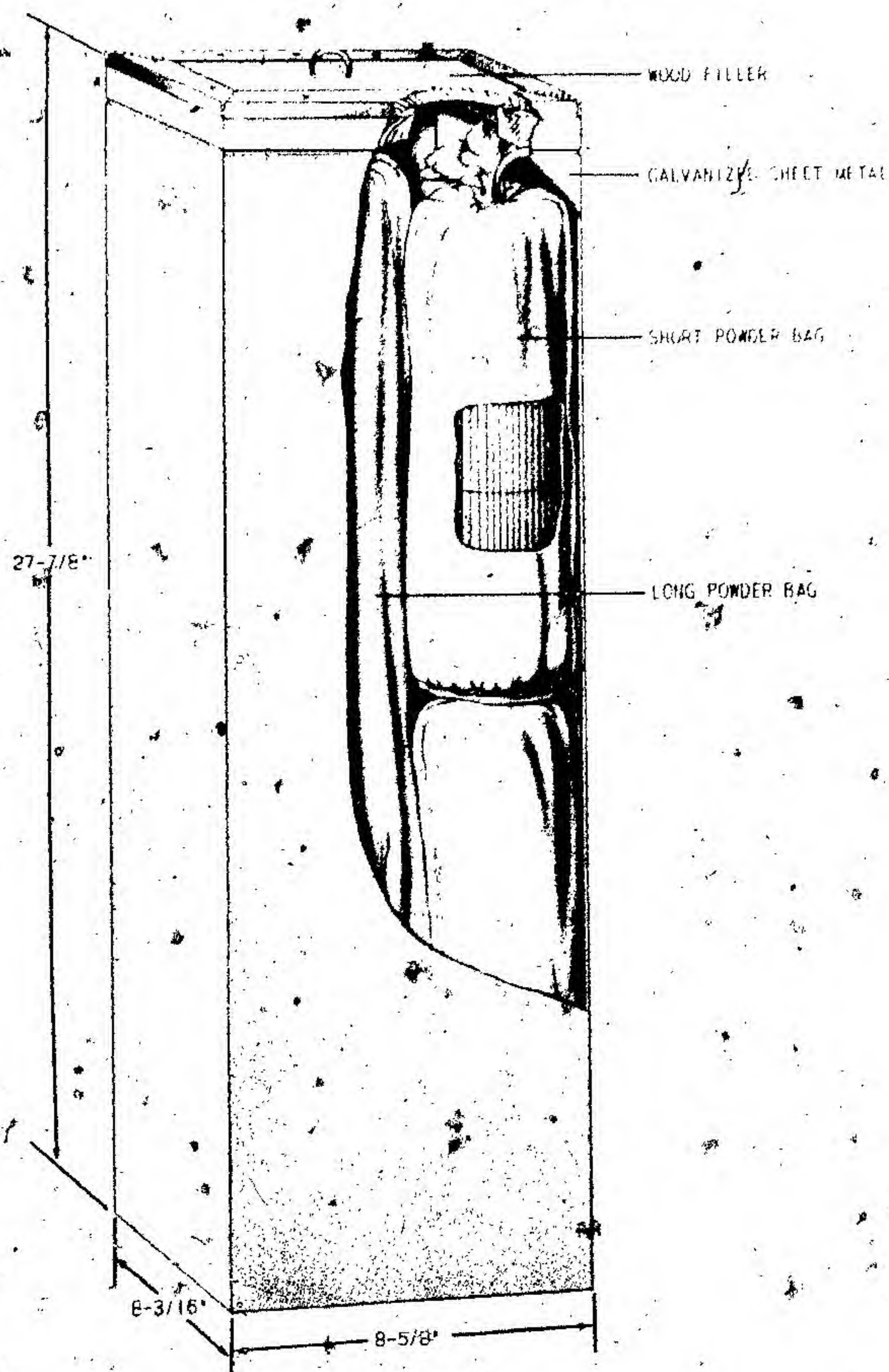


Figure 284—150-mm Powder Box.

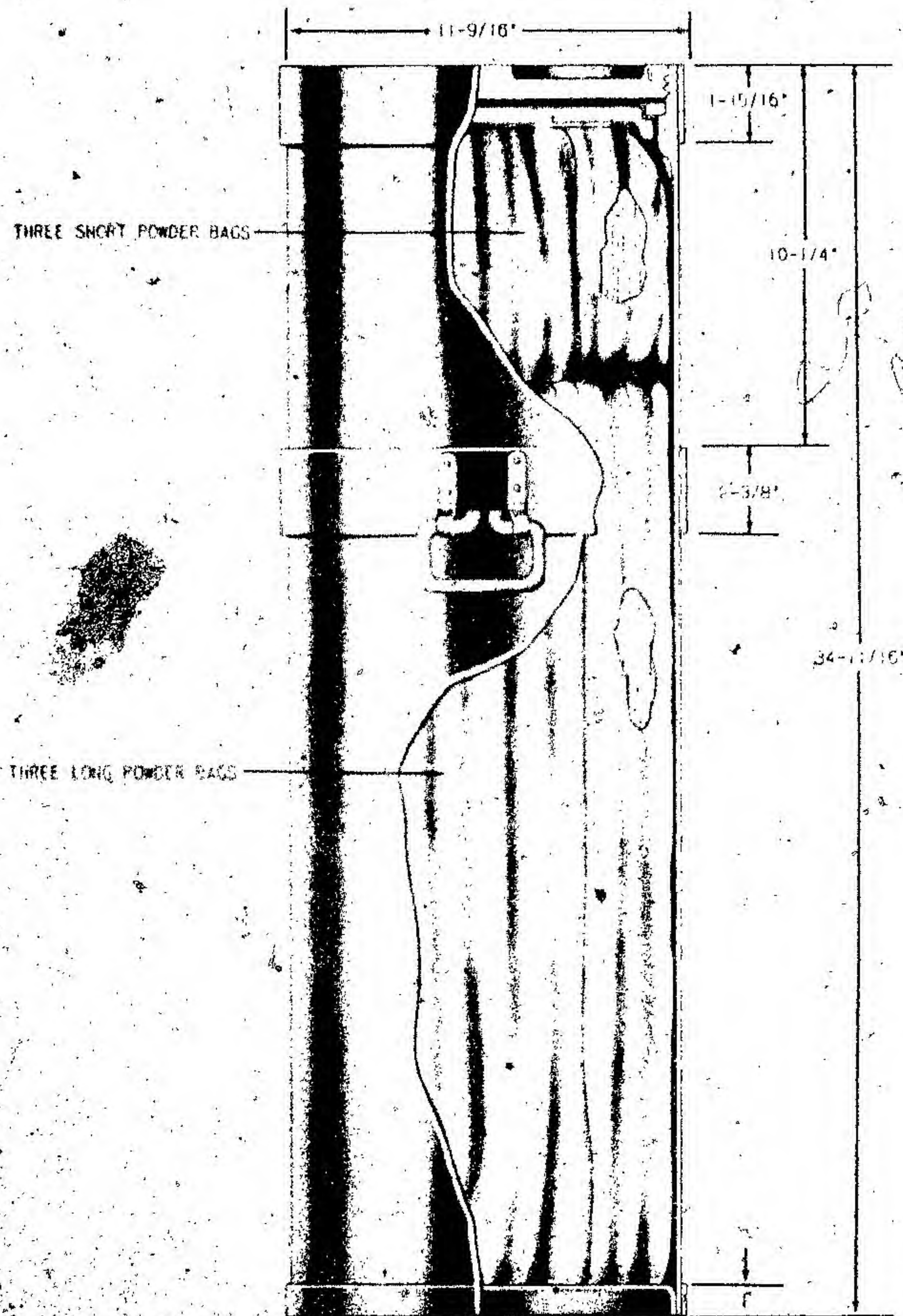


Figure 285—15-cm Ammunition.

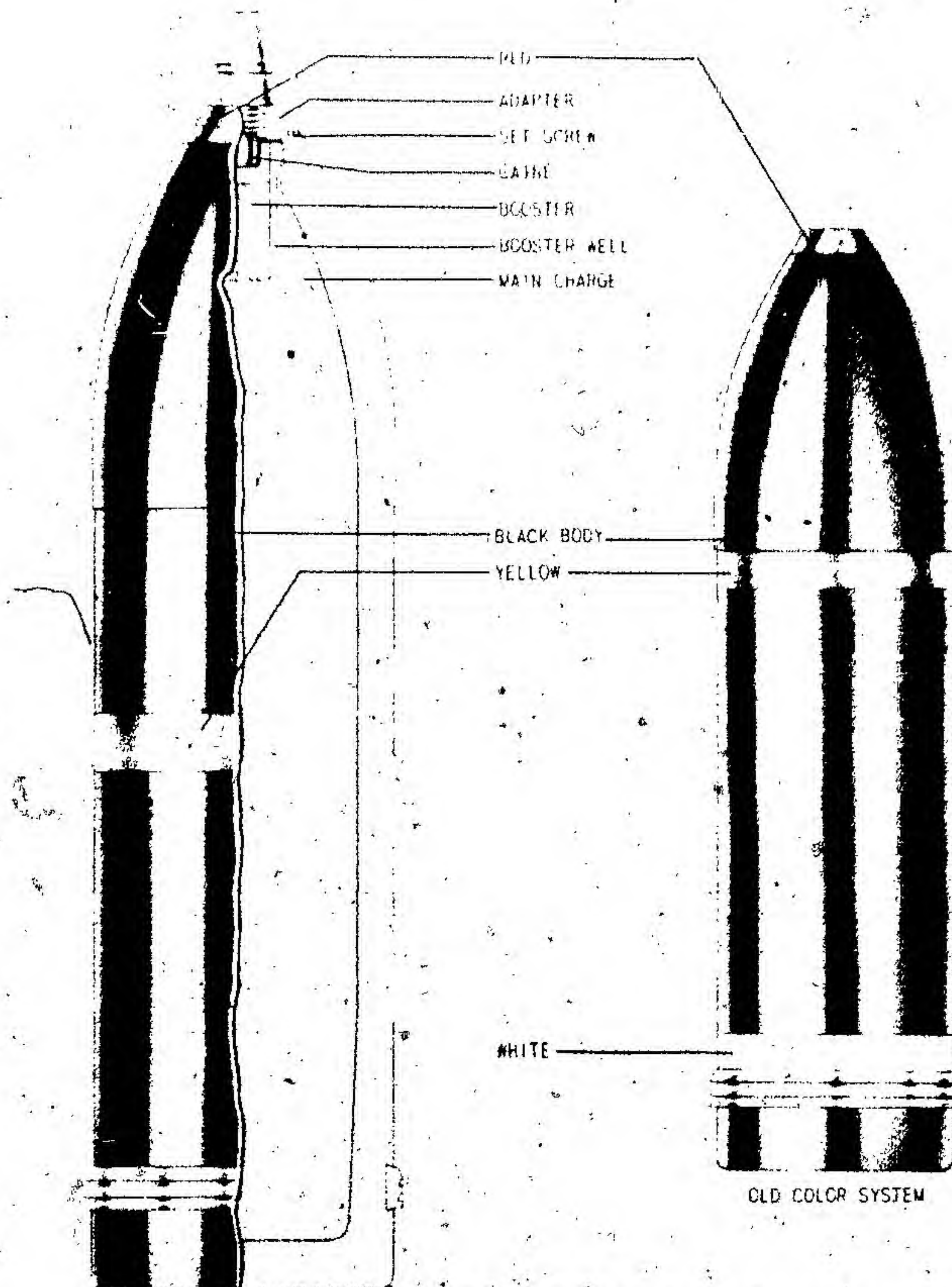


Figure 286—Type 92 15-cm High-Explosive Projectile.

Type 92 15-cm (150-mm) High-Explosive Projectile

Weight of projectile complete: 36 kg. (79.2 pounds).

Weight of filling: No data.

Filling: Angoyaku (RDX and ammonium nitrate).

Diameter at bourrelet: 149 mm (5 $\frac{7}{8}$ inches).

Length over all (without fuze): 563.6 mm (22 $\frac{1}{4}$ inches).

Length protruding from case (without fuze): 508.4 mm (19 $\frac{1}{2}$ inches).

Width of rotating band: 20 mm ($\frac{3}{4}$ inch).

Fuzing:

Type 88 instantaneous nose fuze.

Type 88 short-delay nose fuze.

Weapons in which used:

Type 4-year howitzer, case A, 10 $\frac{1}{2}$ inches; case B, 8 $\frac{7}{8}$ inches.

Type 96 howitzer, case 12 $\frac{1}{2}$ inches.

Type 38 howitzer, case 4 $\frac{1}{4}$ inches.

Type 93 15-cm (150-mm) High-Explosive Projectile

Weight of projectile, filled (without fuze): 40.29 kg. (88.8 pounds).

Weight of filling: No data.

Filling: Cast TNT.

Diameter at copper bourrelet: 149.3 mm (5 $\frac{7}{8}$ inches).

Length over all (without fuze): 593.7 mm (23 $\frac{3}{8}$ inches).

Length protruding from case (without fuze): 544 mm (21 $\frac{3}{8}$ inches).

Width of rotating band:

Forward: 25.4 mm.

Aft: 19.1 mm.

Width of copper bourrelet: 31.75 mm.

Fuzing: Type 90 instantaneous short-delay fuze.

Weapons in which used:

Type 89 gun.

Type 45 gun: Case, 48 $\frac{1}{2}$ inches.

Type 7 year gun: Case, 48 $\frac{1}{2}$ inches.

Type 90 gun: Case, 48 $\frac{1}{2}$ inches.

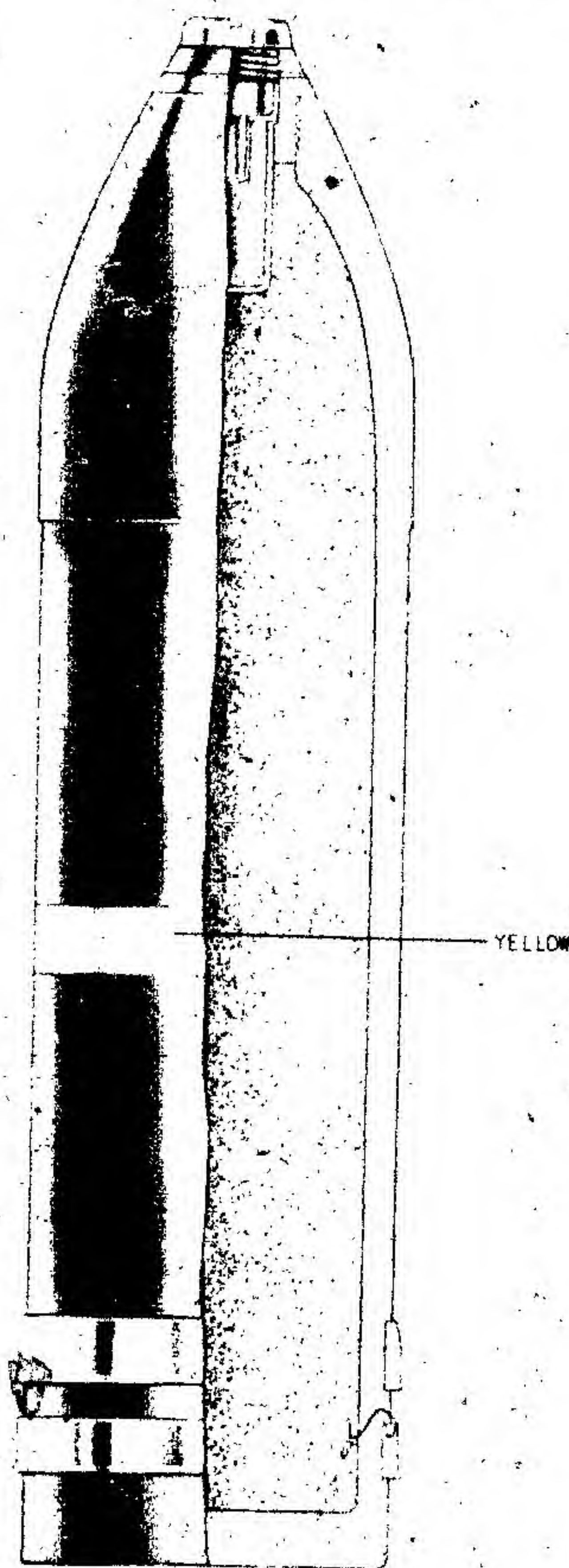


Figure 287—Type 93 15-cm High-Explosive Long-Pointed Projectile.

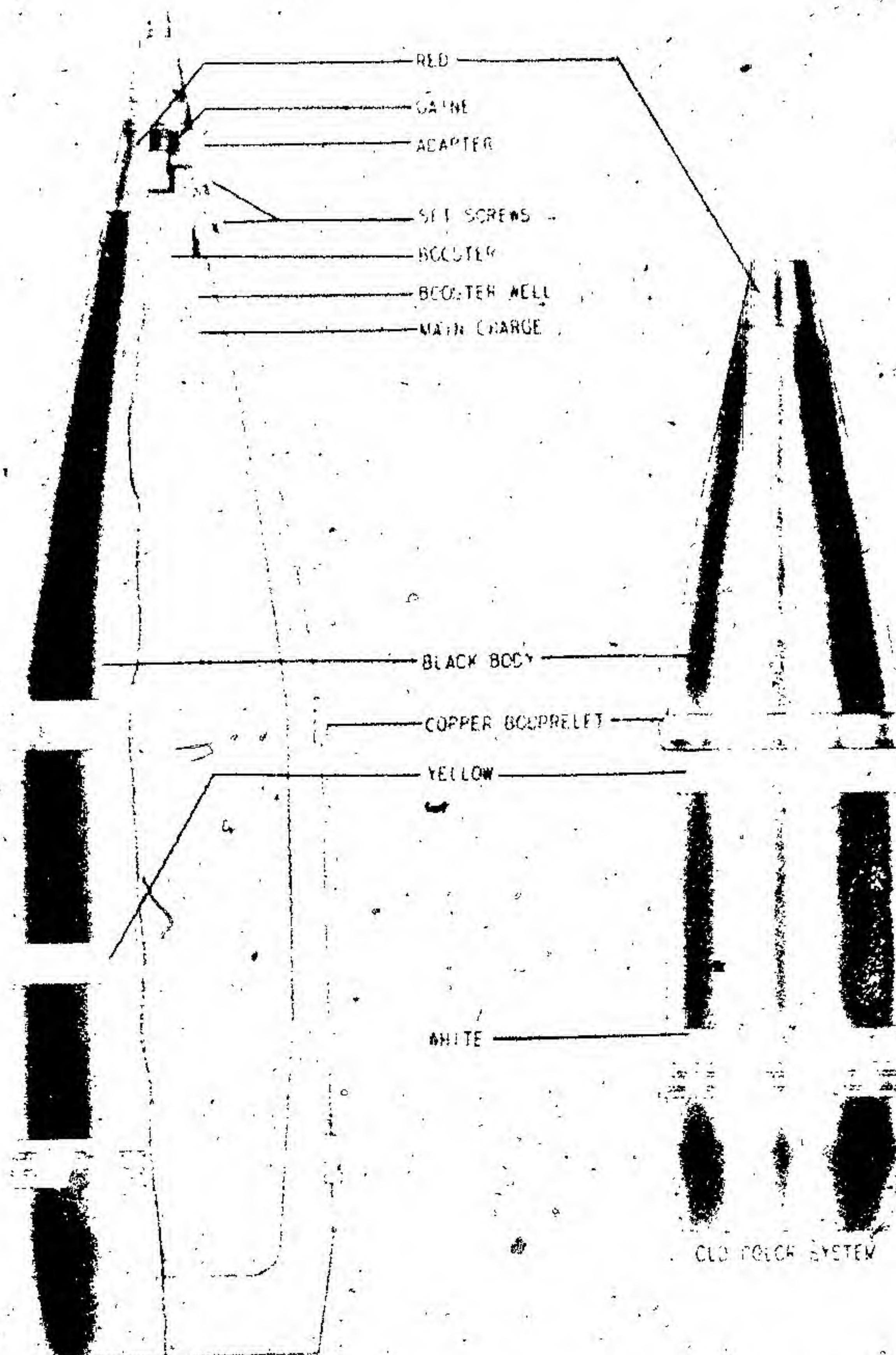


Figure 288—Type 92 15-cm High-Explosive Long-Pointed Projectile.

Type 92 15-cm (150-mm) High Explosive Long-Pointed Projectile

Weight of projectile, filled (without fuze): 30.9 kg. (68 pounds).

Weight of filling: 5.0 kg. (11 pounds).

Filling: Cast TNT.

Diameter at bourrelet: 148 mm (5²⁷/₃₂ inches).

Length over all (without fuze): 581 mm (22¹/₂ inches).

Length protruding from case: 492.1 mm (19³/₄ inches).

Width of rotating band: 14.28 mm (⁹/₁₆ inch).

Width of copper bourrelet: 19.1 mm (³/₄ inch).

Fuzing:

Type 88 instantaneous nose fuze.

Type 88 short delay nose fuze.

Weapons in which used:

Type 4-year howitzer: Case A, 10¹/₈ inches; case B, 8¹/₈ inches.

Type 96 howitzer: Case 12¹/₈ inches.

Type 38 howitzer: Case 4¹/₄ inches.

Type 93 15-cm (150-mm) High-Explosive Long-Pointed Projectile

Weight of projectile, filled (without fuze): 40.23 kg. (88.5 pounds).

Weight of filling: No data.

Filling: Cast TNT.

Diameter of copper bourrelet: 149.2 mm (5 $\frac{7}{8}$ inches).

Length over all (without fuze): 620.2 mm (24 $\frac{3}{8}$ inches).

Length protruding from case (without fuze): 516 mm (20 $\frac{1}{8}$ inches).

Width of rotating band:

Forward: 25.4 mm (1 inch).

Aft: 19.1 mm ($\frac{3}{4}$ inch).

Width of copper bourrelet: 31.8 mm (1 $\frac{1}{4}$ inches).

Fuzing: Type 90 instantaneous short-delay fuze.

Weapons in which used:

Type 89 gun.

Type 45 gun; Case, 48 $\frac{1}{2}$ inches.

Type 7-year gun; Case, 48 $\frac{1}{2}$ inches.

Type 90 gun; Case, 48 $\frac{1}{2}$ inches.

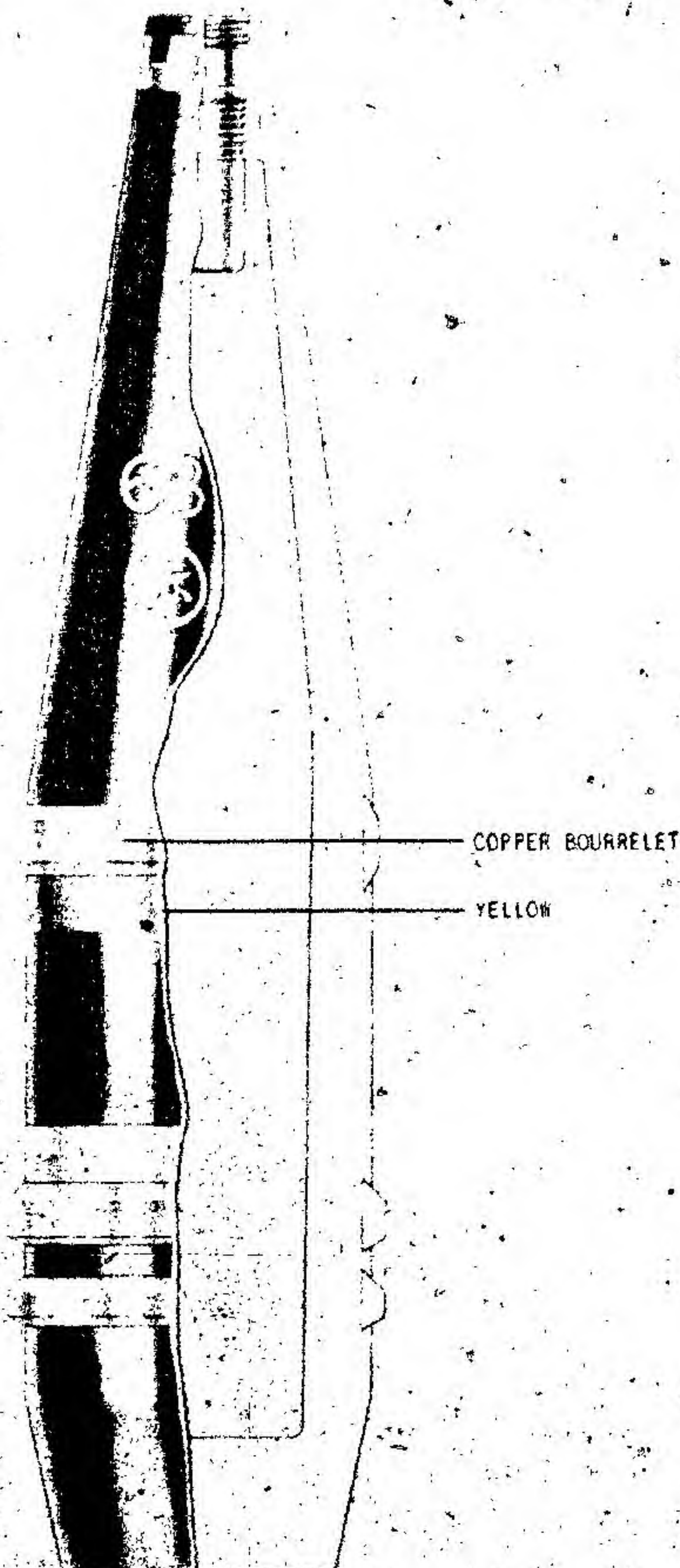


Figure 289—Type 93 15-cm High-Explosive Long-Pointed Projectile.

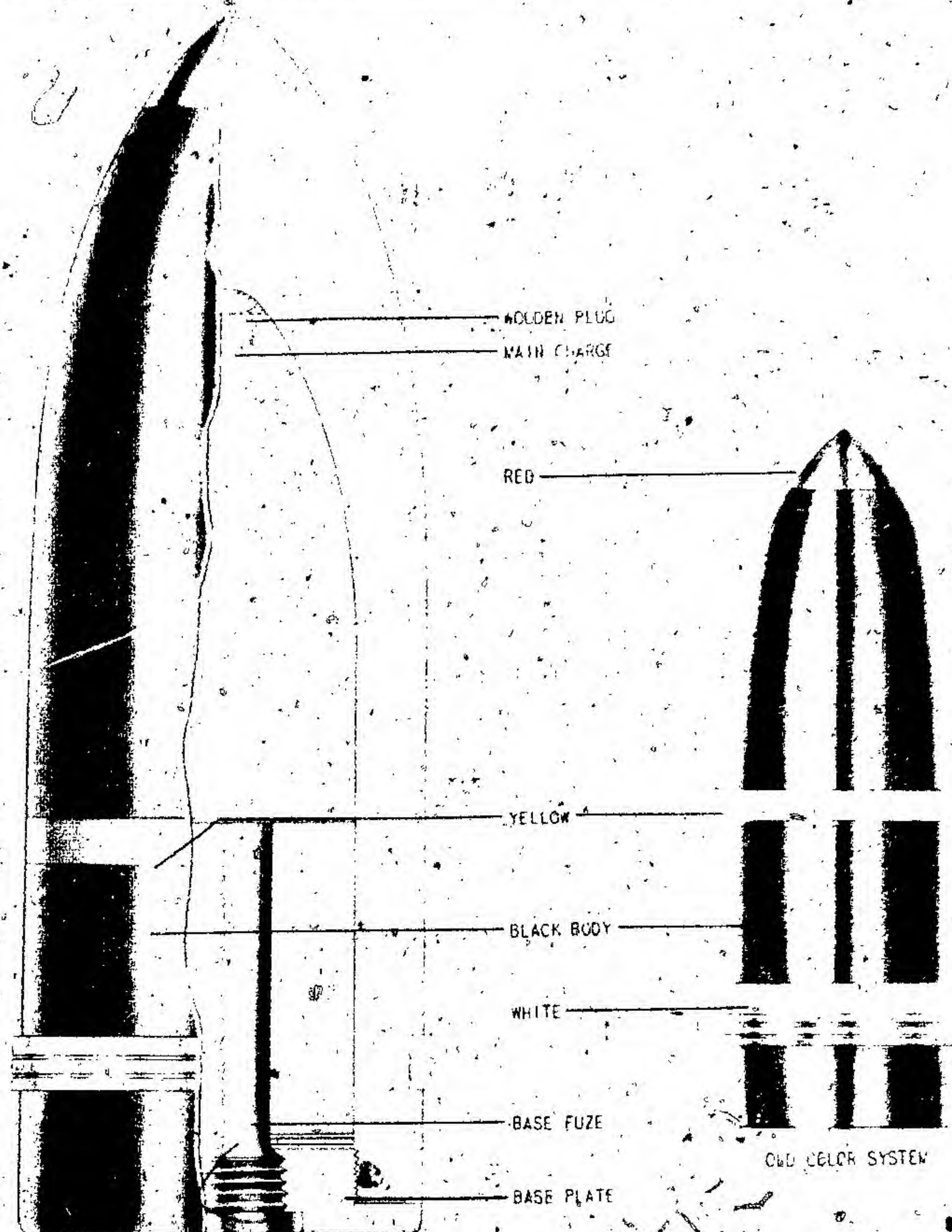


Figure 290—Type 95 15-cm Armor-Piercing High-Explosive Projectile.

Type 95 15-cm (150-mm) Armor-Piercing High-Explosive Projectile

Weight of projectile, filled (fuzed): 36.1 kg. (79.5 pounds)

Weight of filling: 2.3 kg. (5 pounds).

Filling: Two preformed blocks of high grade TNT.

Diameter at bourrelet: 150 mm (5¹⁵/₁₆ inches).

Length of projectile (without fuze): 449.3 mm (17¹/₈ inches).

Length protruding from case: 406.4 mm (16 inches).

Width of rotating band: 20.6 mm (8¹/₁₆ inch).

Fuzing: Type 95 medium howitzer-mortar base fuze.

Weapons in which used:

Type 4-year howitzer: Case A, 10³/₈ inches; case B, 8¹/₈ inches.

Type 38 howitzer: Case, 4¹/₈ inches.

Type 96 howitzer: Case, 12³/₈ inches.

Type 45 gun: Case, 48¹/₂ inches.

Type 7-year gun: Case, 48¹/₂ inches.

Type 90 gun: Case, 48¹/₂ inches.

Type 89 gun: Bag charge.

Remarks: When this projectile is used in a howitzer, it has a single rotating band, but when it is used in guns it has a double rotating band.

15-cm (150-mm) Armor-Piercing High-Explosive Projectile

Weight of projectile, filled: 44.54 kg. (98 pounds).
Weight of filling: 5.2 kg. (11.5 pounds).
Filling: Picric acid in two preformed, paper-wrapped blocks.
Diameter at copper bourrelet: 149.2 mm (5 7/8 inches).

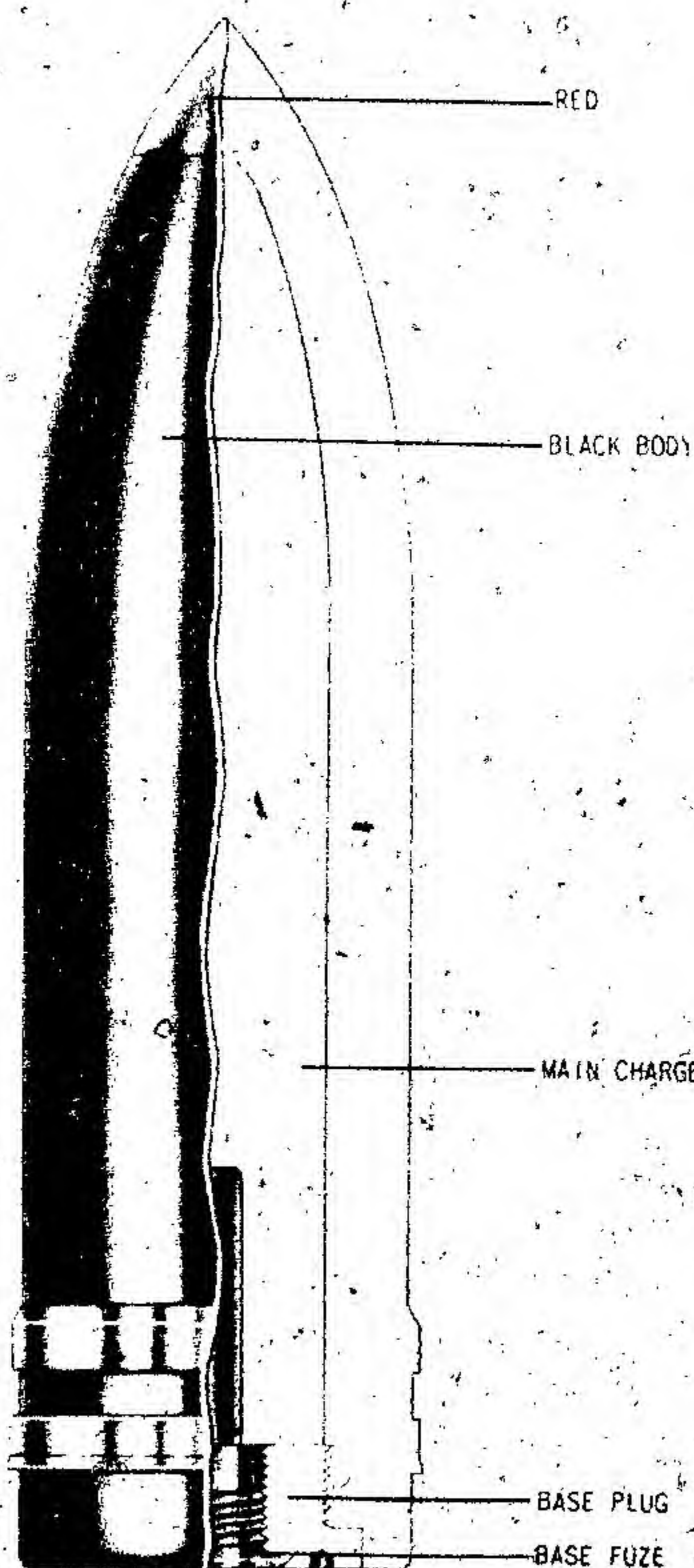


Figure 291—15-cm Armor-Piercing High-Explosive Projectile.

Length over all: 584.2 mm (23 inches).
Length protruding from case (without fuze): 544.5 mm (21 1/4 inches).
Width of rotating bands:
Forward: 25.4 mm (1 inch).
Aft: 19.1 mm (3/4 inch).
Fuzing: Type 88 small base fuze.
Weapons in which used:
Type 89 gun.
Type 45 gun: Case, 48 1/2 inches.
Type 7-year gun: Case, 48 1/2 inches.
Type 90 gun: Case, 48 1/2 inches.
Type 4-year howitzer: Case A, 10 3/8 inches; case B, 8 7/8 inches.
Type 38 howitzer: Case, 4 1/4 inches.
Type 96 howitzer: Case 12 3/8 inches.

Remarks: When this projectile is used in a howitzer, it has a single rotating band; but when it is used in guns it has a double rotating band.

Type 13-Year Smoke (W. P.) Projectile

Weight of projectile, filled (without fuze): 33.63 kg. (74.25 pounds).
Bursting charge (cast picric acid): 1 kg. (2.2 pounds).
Chemical agent: 3.62 kg. (8 pounds).
W. P. is contained in a brass cylinder fitted below the bursting charge. To prevent movement within the projectile, the container is surrounded by wax.
Diameter at bourrelet: 149.2 mm (5 7/8 inches).
Length over all (without fuze): 487.4 mm (19 1/4 inches).
Length protruding from case (without fuze): 471.5 mm (18 5/8 inches).
Width of rotating band: 15.0 mm (1 1/2 inch).
Fuzing: Type 88 instantaneous nose fuze (howitzer, mortar).

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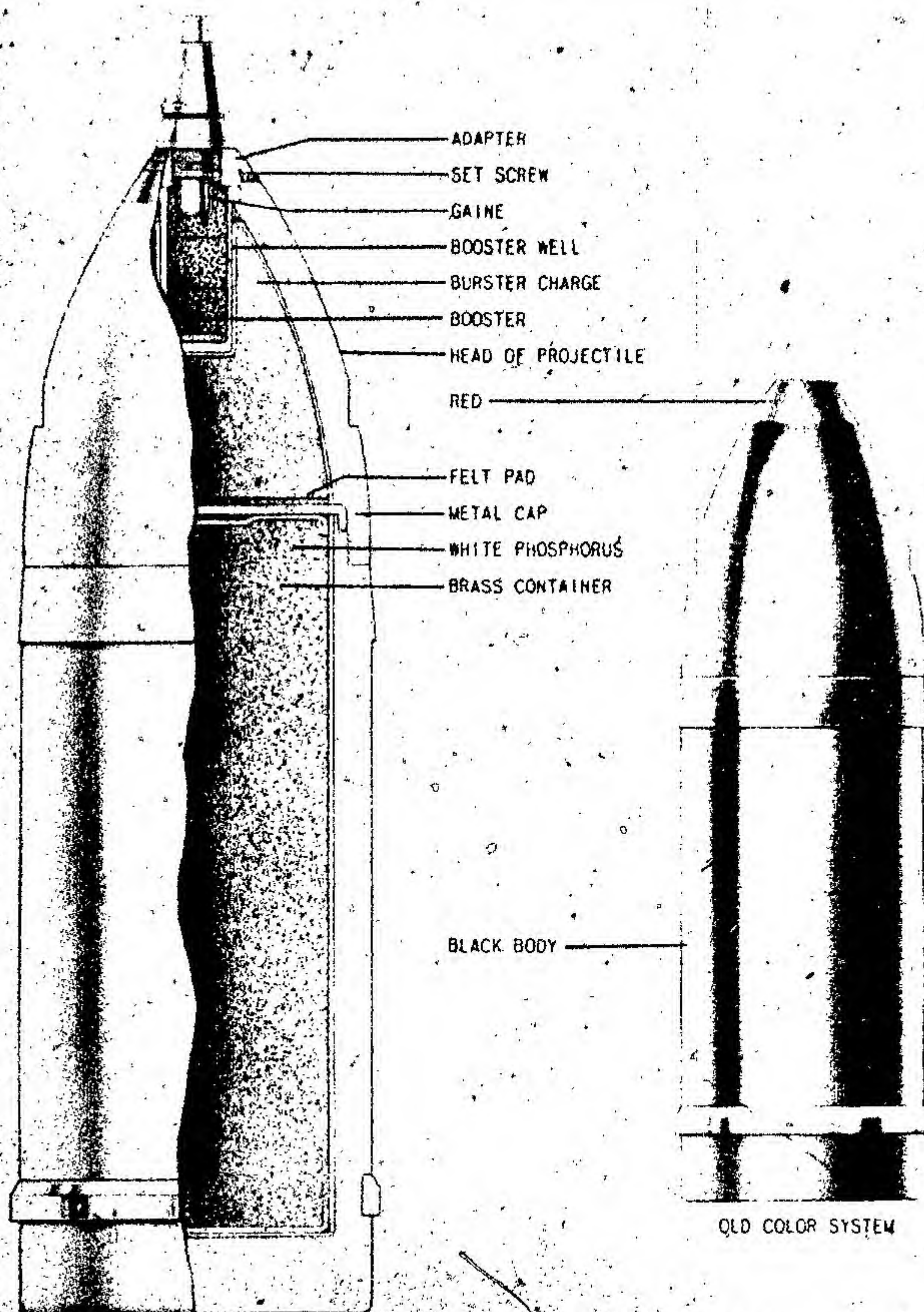


Figure 292—Type 13-Year Smoke (W. P.) Projectile.

Weapons in which used:

4th-year type howitzer: Case A, 10 $\frac{3}{16}$ inches;
 case B, 8 $\frac{7}{8}$ inches.

Type 96 howitzer: Case 12 $\frac{1}{2}$ inches.

Type 38 howitzer: Case 4 $\frac{1}{4}$ inches.

30-cm (305-mm) Armor-Piercing High-Explosive Projectile

Weight of projectile: No data.
Weight of filling: No data.
Filling: No data.

Diameter at bourrelet: 305 mm (12 inches).
Length over all: 1,071 mm (42 $\frac{1}{4}$ inches).
Length protruding from case: 1,027 mm (40 $\frac{1}{16}$ inches).

Width of rotating band: 53 mm (2 $\frac{1}{16}$ inches).
Fuzing: Type 95 Large Mk 2 Model 2 base fuze.
Weapons in which used: Type 7-year 30-cm howitzer.

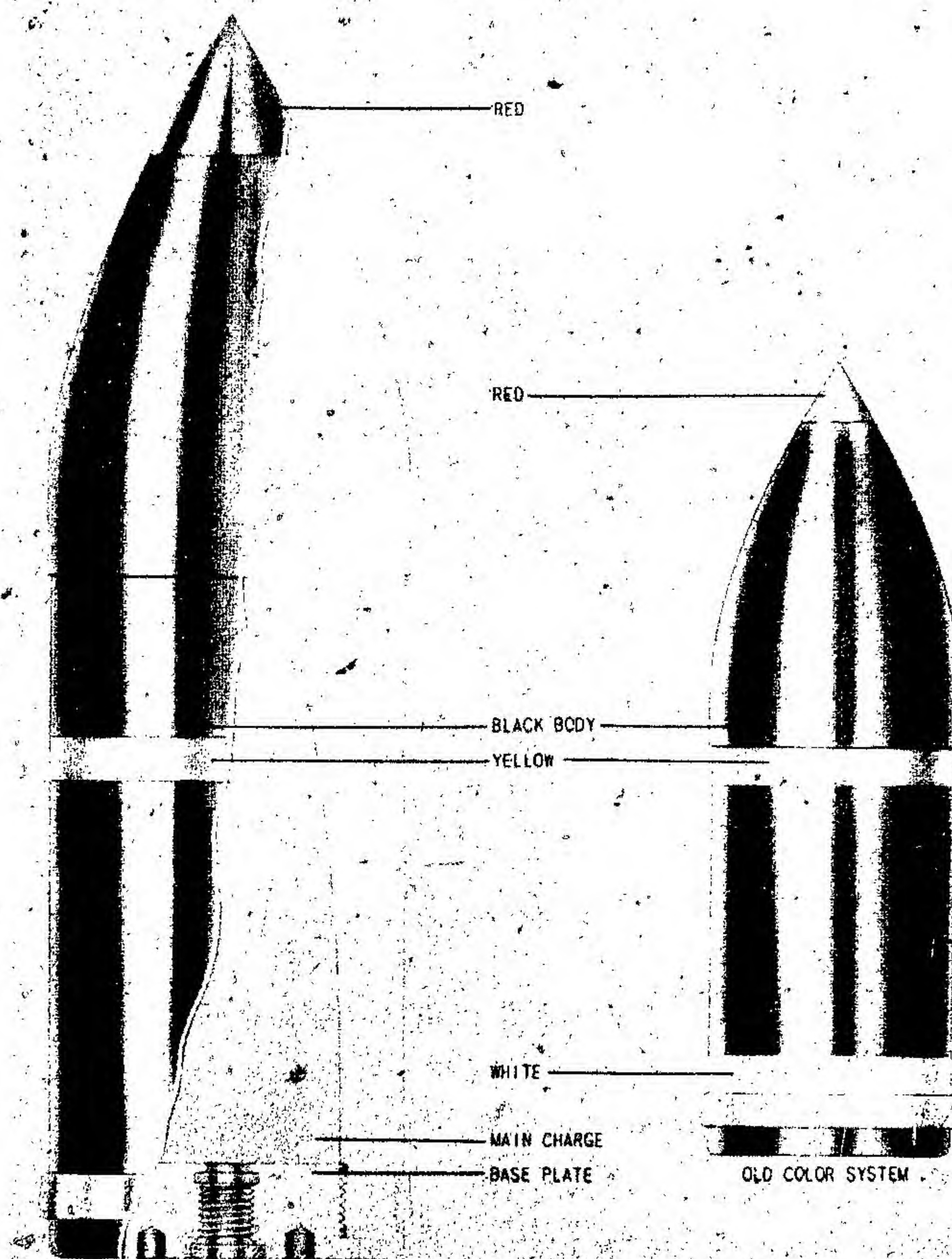


Figure 293—30-cm Armor-Piercing High-Explosive Projectile.

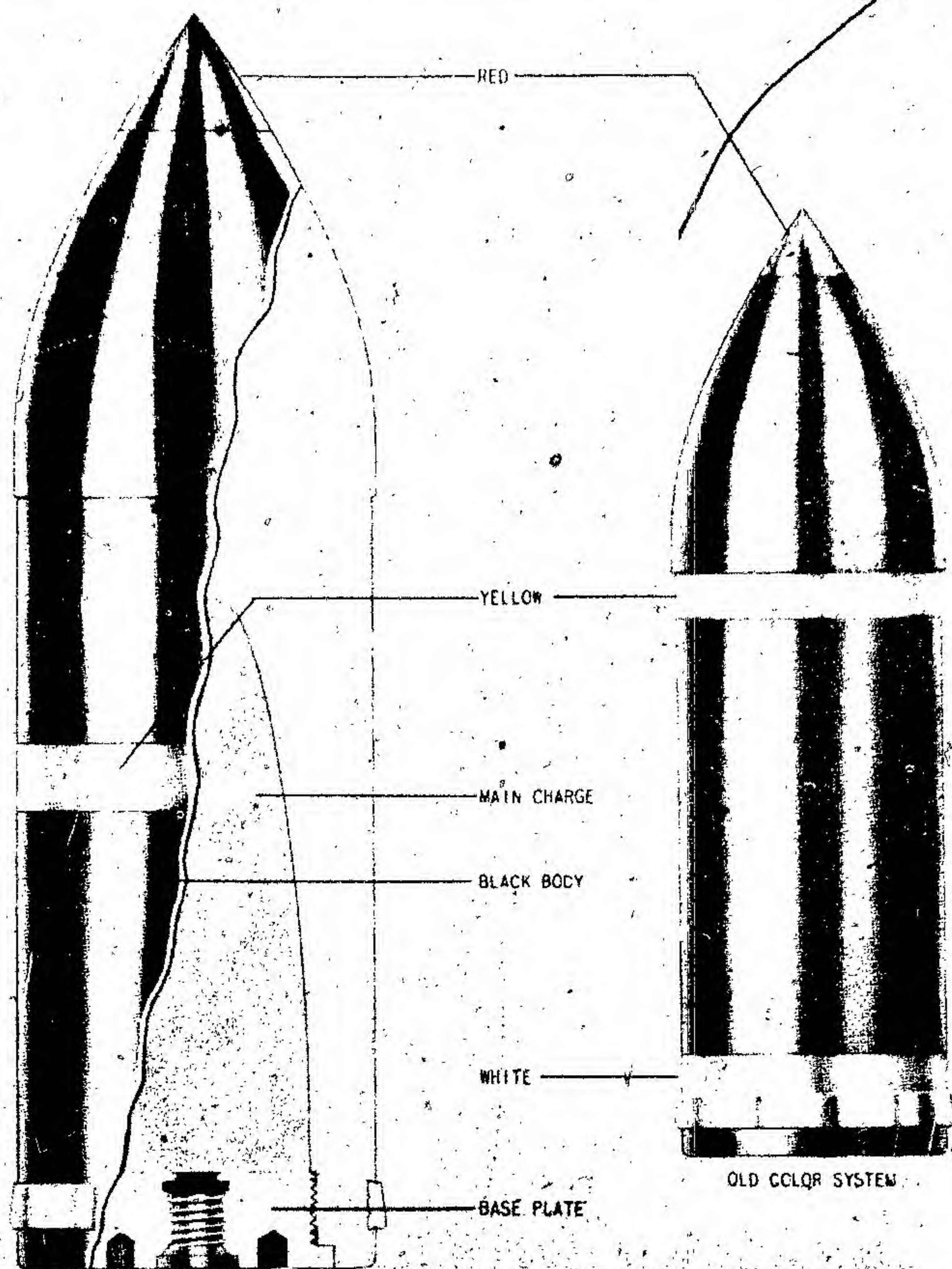


Figure 294—30-cm Armor-Piercing High-Explosive Projectile.

30-cm (305-mm) Armor-Piercing High-Explosive Projectile

Weight of projectile (approximately): 680 pounds.

Weight of filling: No data.

Filling: No data.

Diameter at bourrelet: 305 mm (12 inches).

Length over all: 1,240 mm (48¹¹/₁₆ inches).

Length protruding from case: 1,198 mm (47¹¹/₁₆ inches).

Width of rotating band: 53 mm (2¹/₁₆ inches).

Fuzing: Type 95 large Mk 2 Model 2 base fuze.

Weapons in which used: Type 7-year 30-cm howitzer.

Chapter 4—Section 2

ARMY ROCKETS

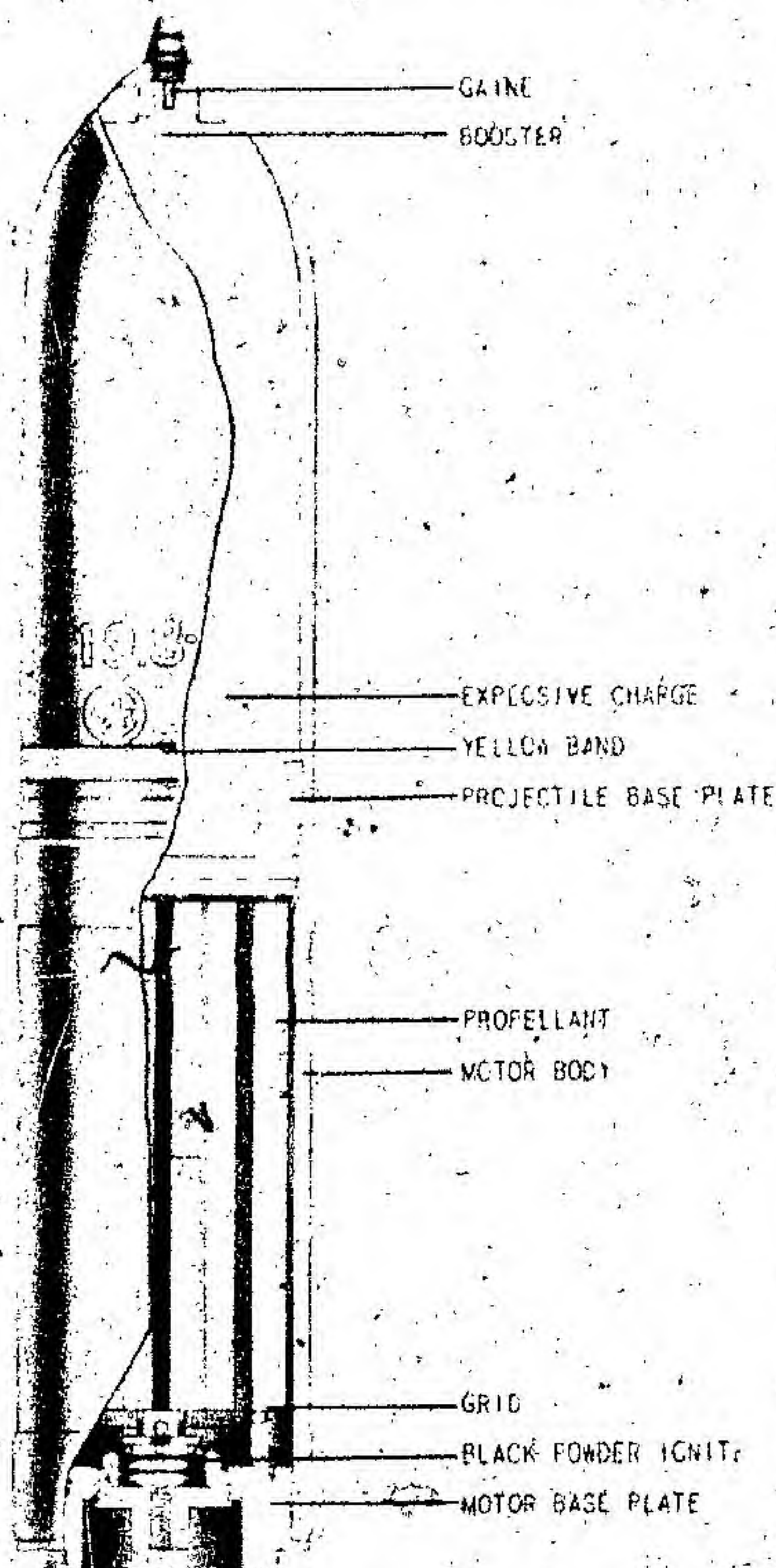


Figure 295—20-cm High-Explosive Spin-Stabilized Rocket.

20-cm H. E. Spin-Stabilized Rocket

Assembled round:

Weight of complete round: 188.31 pounds
(84.51 kg.).

Length of complete round (with fuze): 38.58
inches.

Head:

Weight of filled head (without fuze): 86.42
pounds.

Weight of filling (cast TNT): 35.71 pounds
(16.2 kg.).

Length of head (without fuze): 17.52 inches.

Diameter of head: 7.87 inches (20 cm.).

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Filling: Cast TNT, 35.71 pounds (16.2 kg.).

Fuzing: Army type 100 mortar fuze: Selective instantaneous, short delay.

Motor:

Weight of filled motor: 99.89 pounds.

Weight of propellant: 20.99 pounds (9.52 kg.).

Length of motor: 19.06 inches.

Diameter of bearing surface: 7.99 inches (20.3 cm.).

Propellant:

Type: Smokeless powder B.

Weight: 20.99 pounds (9.52 kg.).

Number of sticks: 6 long, 2 short.

Smokeless powder B by analysis is a mixture of 27.71 percent N. G., 63.50 percent nitrocellulose, 0.45 percent graphite, 0.34 percent ash, 3.81 percent ethylcentralite, 3.68 percent diphenyl formamide, and 1.30 percent volatiles. Six long sticks (34.0 cm. by 5.8 cm. by 1.05 cm. perf.) and two short sticks same diameter and perforation and $\frac{1}{2}$ length. In some cases, one or both

of the short grains have been omitted in assembly.

Ignition mechanism:

Igniter: Pull friction igniter.

Ignition charge (B. P. in two blue lacquered silk bags).

Weight of ignition charge: 0.09 pound (0.04 kg.).

Color and markings: Black over all. Head carries single yellow band at its junction with rocket motor. Weight of head and motor stenciled on each component.

Launcher: The only launcher recovered for use with this round is a single barrel-type launcher.

Remarks: A newer model of this round has been recovered, similar to the first but with the rocket motor wall diametrically reduced to 18.9 cm. (7.44 inches), giving a bourrelet effect at each end of the motor. The motor weight is correspondingly reduced to 42.43 kg. Neither the head nor the motor is interchangeable with its respective component in the older round.

Chapter 4—Section 3

ARMY MORTARS

Type 89 58-mm H. E. Mortar

Weight complete round: 1.6 pound.

Weight main charge: 5.4 ounces.

Explosive components:

Main charge: TNT.

Propellant: Nitrocellulose diphenylamine flaked powder.

Over all length (without fuze): 4.33 inches.

Maximum diameter: 1.97 inches (50 mm).

Color:

1. Black over all with red band at nose, and a. Yellow band below the bourrelet and white band forward of rotating band, b. Or, yellow band midway on the shell.
2. Maroon color over all for Navy use.
3. Green nose, black body with yellow and white bands.

Fuzing: Type 88 small instantaneous fuze.

Weapon in which used: Type 89 grenade discharger.

Description: The body of this shell is made of three parts. The propellant base housing houses the propellant container and the percussion primer. The main shell base cover is threaded to the top section on one end and to the propellant housing on the other. The top section has an opening in the top to receive the fuze.

On firing, the gases generated blow through the ports in the base housing, expanding the copper rotating band into the rifling of the discharger giving a gas seal and imparting rotation to the shell.

Remarks: The Navy version of this shell is exactly the same in construction as the Army version; the only variation being in the color scheme. Two minor variations of construction have been found.

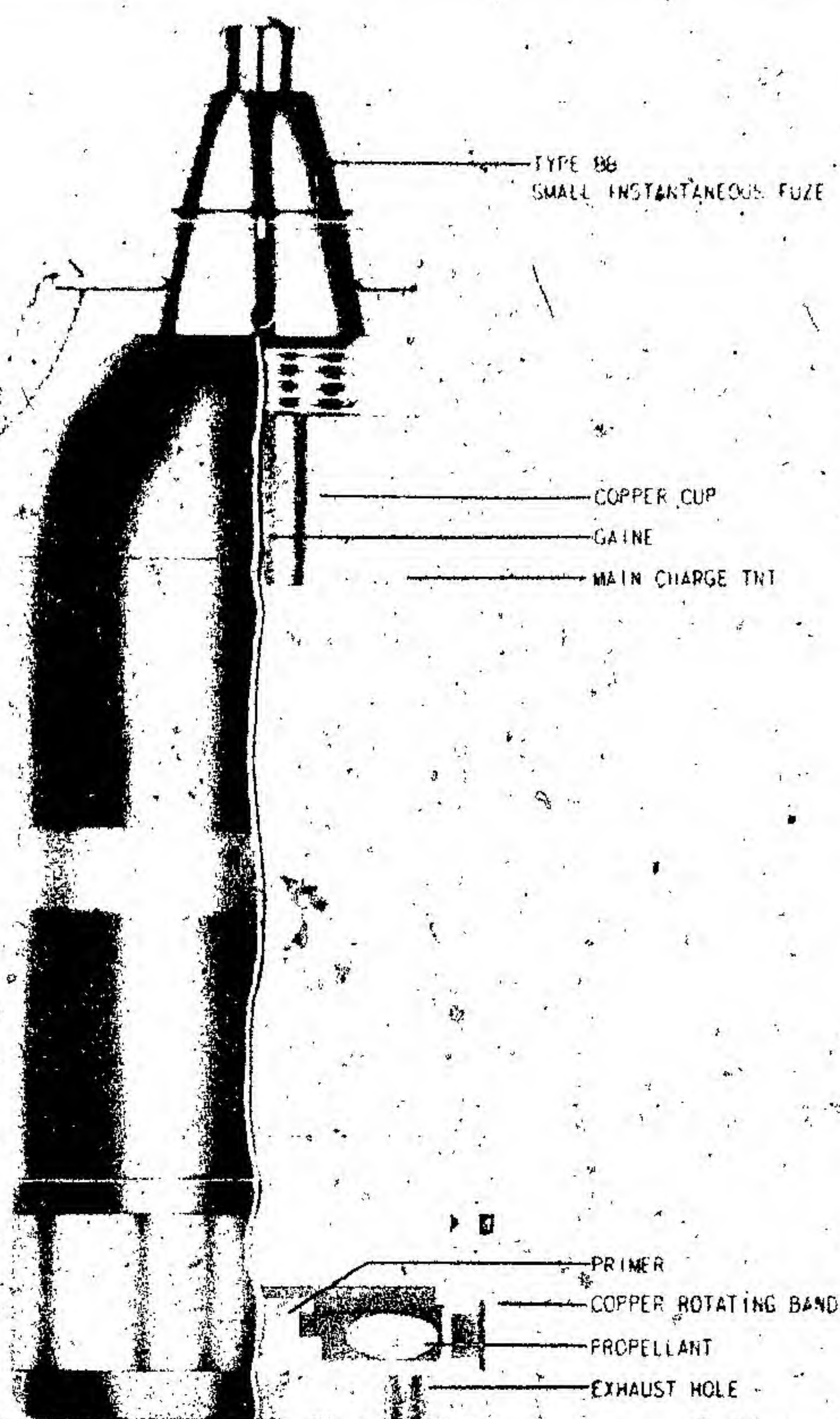


Figure 296—Type 89 58-mm High-Explosive Mortar.

1. The nose portion screws on (LH) the body directly below the bourrelet. The base is solid instead of being closed with a base plate.

2. Similar to the first variation except the threads are right hand.

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Type 95 50-mm Smoke Mortar

Weight complete round: 1.9 pounds.

Weight smoke filling: 3.7 ounces.

Filler:

Smoke compound: Hexachlorethane smoke mixture.

Propellant: Nitrocellulose diphenylamine flaked powder.

Over all length (without fuze): 4.33 inches.

Maximum diameter: 1.97 inches (50 mm).

Color: Black over all with a red band at the nose and two white bands, one immediately below the bourrelet and the other before the rotating band.

Fuzing: Type 89 small time fuze.

Weapons in which used: Type 89 grenade discharger.

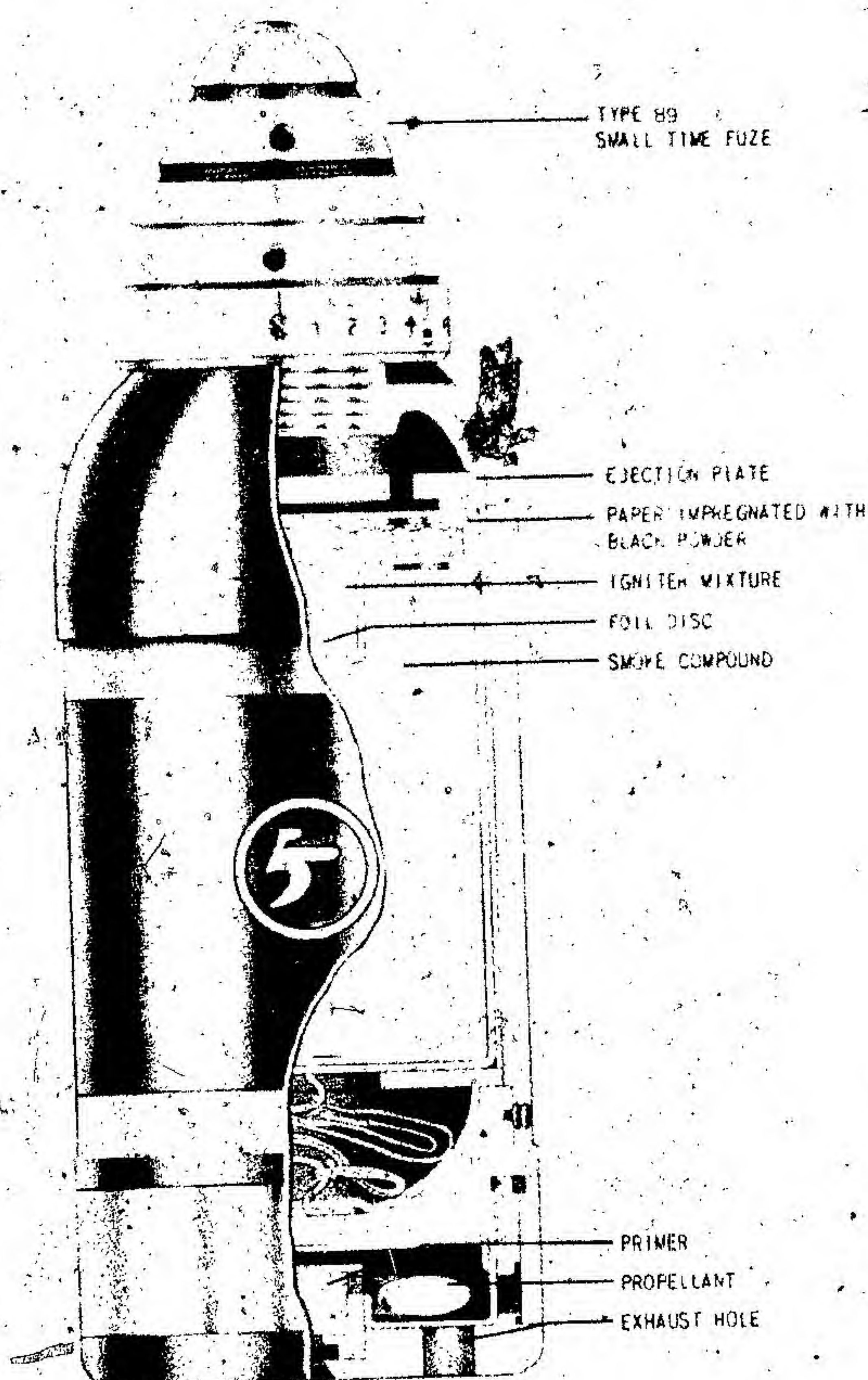


Figure 297—Type 95 50-mm Smoke Mortar.

Description: The projectile casing is of forged steel. The nose screws onto the main body at a point just behind the bourrelet. The main body is joined to the base with a press-fit held by four screw shear pins. The propellant base housing which screws onto the shell base is similar in construction and operation to that of the H. E.

shell. The smoke mixture is held in a brass can inside the main body and has attached to it by a short cord a steel retarder cup to slow its descent.

Operation: When the fuze gaine fires, it ruptures the thin plate in the base of the gaine, ignites the smoke mixture, and expels the smoke candle from the shell casing.

Type 89 50-mm Incendiary Mortar

Weight complete round: 1.25 pounds.

Weight incendiary mixture: 10.7 ounce.

Filling: Incendiary mixture:

Potassium nitrate: 47.7 percent.

Aluminum: 21.7 percent.

Sulphur: 19.9 percent.

Antimony trisulphide: 6.1 percent.

Wax: 2.8 percent.

Propellant: Nitrocellulose powder.

Over all length: 6.25 inches.

Length propellant containers: 1.25 inches.

Diameter propellant container: 1.02 inches.

Maximum diameter: 1.97 inches (50 mm).

Color: Natural brass body with black propellant container.

Fuzing: Powder delay train.

Weapon in which used: Type 89 grenade discharger.

Description: The shell is a cylindrical sheet-metal tube with a hemispherical nose and is covered with clear lacquer. Around the side of the casing are four silver-foil disks, each disc covering seven ports in the shell casing. The casing is crimped over the base, which contains two black-powder delay trains and is threaded to receive the propellant housing. The propellant housing is of steel, with six gas-escape ports in the sides and a percussion cap set in the screwed-in base. The propellant is contained in a copper cup inside the propellant housing.

Operation: The flash from the propellant ignites the delay trains in the base of the shell, which in turn ignite the incendiary filling.

Remarks: Another incendiary shell, the type 10-year, is similar in appearance and operation.

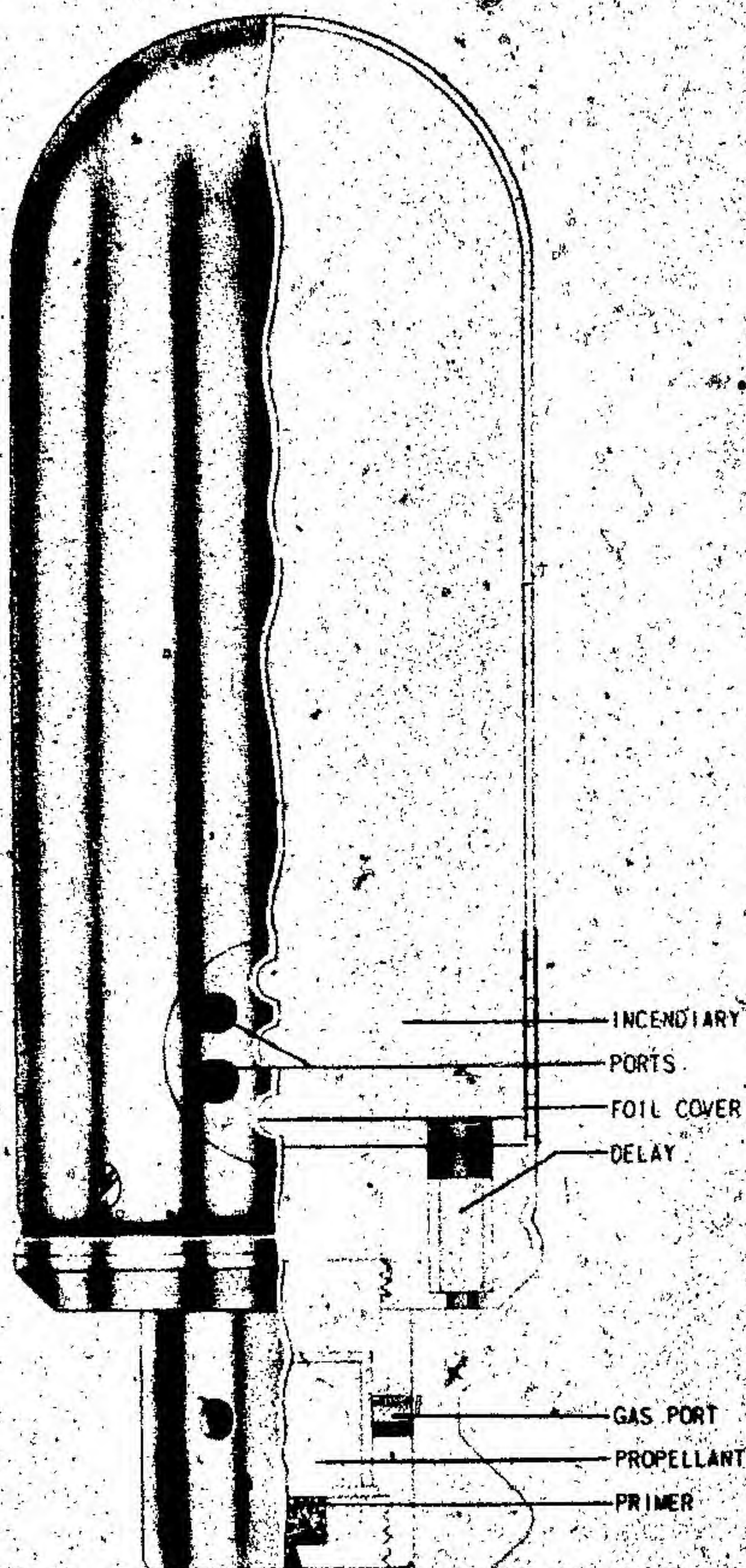


Figure 298—Type 89 50-mm Incendiary Mortar.

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to the type 89 shell. It is 5½ inches in length; the color of the body is natural brass; and the propellant assembly is black. There are eight sets of perforations covered with silver-foil disks. The type 10-year shell is fired from the type 10-year grenade discharger, an obsolete weapon that was the forerunner of the type 89 grenade discharger.

50-mm Finned Bangalore Torpedo

Weight complete round: 17.89 pounds.

Weight main charge: 6.34 pounds.

Main charge: Picric.

Over-all length (without fuze): 78.37 inches.

Base, section length: 33.25 inches.

Length from after end of base to forward bearing surface of base section: 12.75 inches.

Maximum diameter of explosion tube: 1.97 inches (50 mm).

Fins:

Length: 14.75 inches.

Maximum width: 3.5 inches.

Minimum width: 2.5 inches.

Color: Fins and bangalore section are painted tan with a red band at the top of each section.

The modified portion of the base section is painted black.

Fuzing: Instantaneous delay fuze for bangalore mortar.

Weapon in which used: Type 98 discharger.

Description: The projectile is constructed in two sections. The nose section is a standard bangalore length, while the base section is a bangalore length cut off and modified to fit into the barrel of the discharger. This section also has three spot-welded brackets to which the sheet metal fins are bolted. A cap, having two circumferential grooves cut into it to divide the surface into three after bearing surfaces, is welded around the after end of the base section. A length of 50-mm tubing is welded to the base section and serves as a forward bearing surface for the projectile. A plate is welded to the bangalore base section to prevent the bangalore from sliding too far down into the launcher tube.



Figure 299—50-mm Finned Bangalore Torpedo.

50-mm Stick Charges

	Small	Large
Weight complete round	15.62 pounds	17 pounds.
Weight main charge	7.0 pounds	10 pounds.
Explosive components:		
Main charge	Picric	Picric.
Propellant	Black powder	Black powder.
Over-all length	27.35 inches	25.5 inches.
Length explosive container	6.75 inches	4.5 inches.
Width explosive container	4.5 inches	6.25 inches.
Height explosive container	4.5 inches	6.25 inches.
Wall thickness	0.05 inch	0.25 inch.
Diameter of stick	1.97 inches (50 mm)	1.97 inches (50 mm).
Color: The metal explosive container is painted black, while the wooden "stick" is left unpainted. The large model has a white stripe fore and aft around the explosive box.		

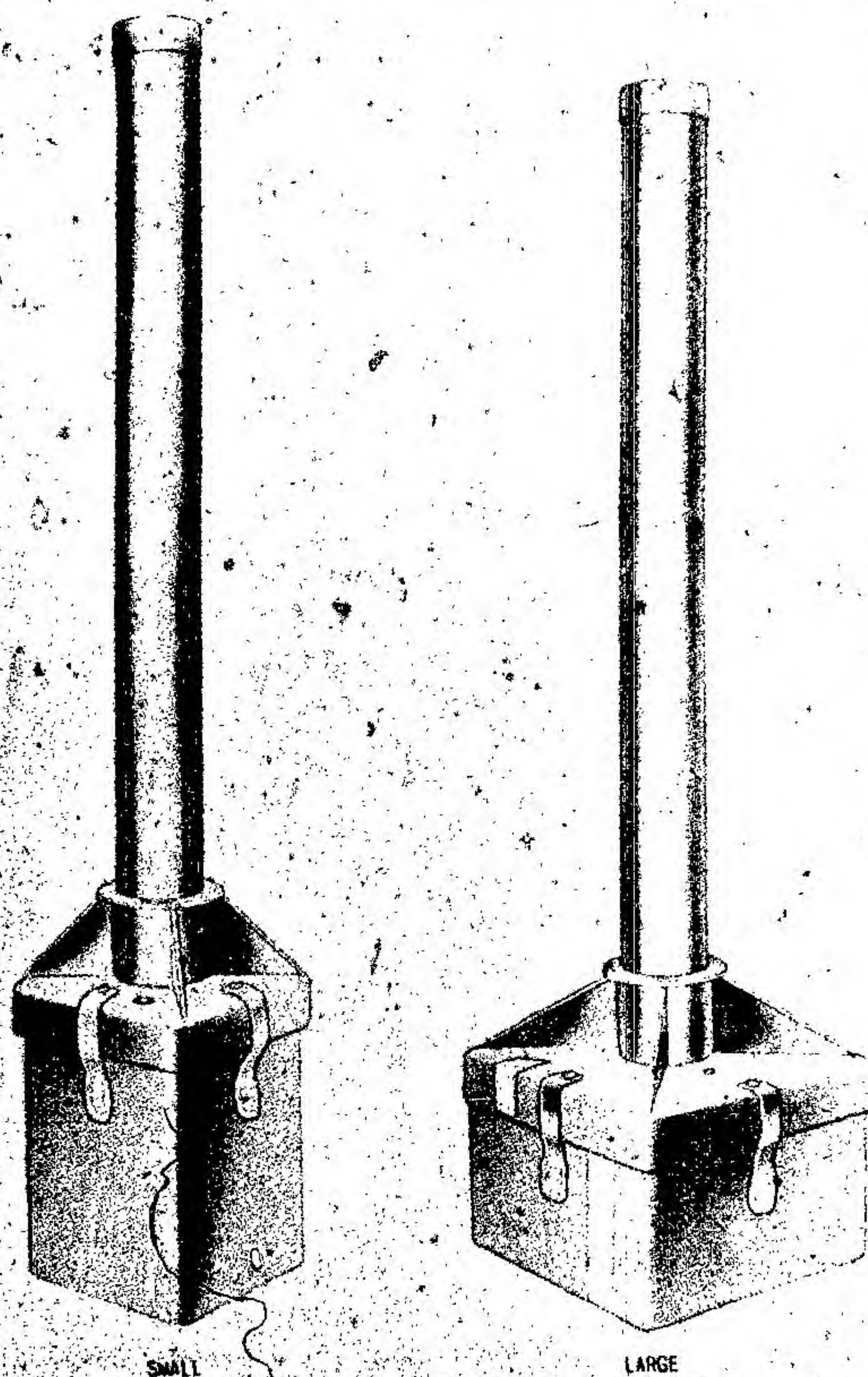


Figure 300—50-mm Stick Charges.

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Weapon in which used: Type 98 discharger.
Fuzing: Two pull igniters.

Description: The projectile consists of a cast-iron box containing blocks of picric acid mounted on a wooden pole 50 mm in diameter. Two pull igniters are inserted in the bursting charge and are tied to metal loops on each side of the launcher tube collar. When the projectile is fired these pull igniters are initiated and will in turn set off the bursting charge after a short delay. The black powder propellant in silk bags is placed in the launcher tube below and independently of the projectile. The propellant is fired by a pull igniter inserted in the ignition aperture in the side of the launcher tube.

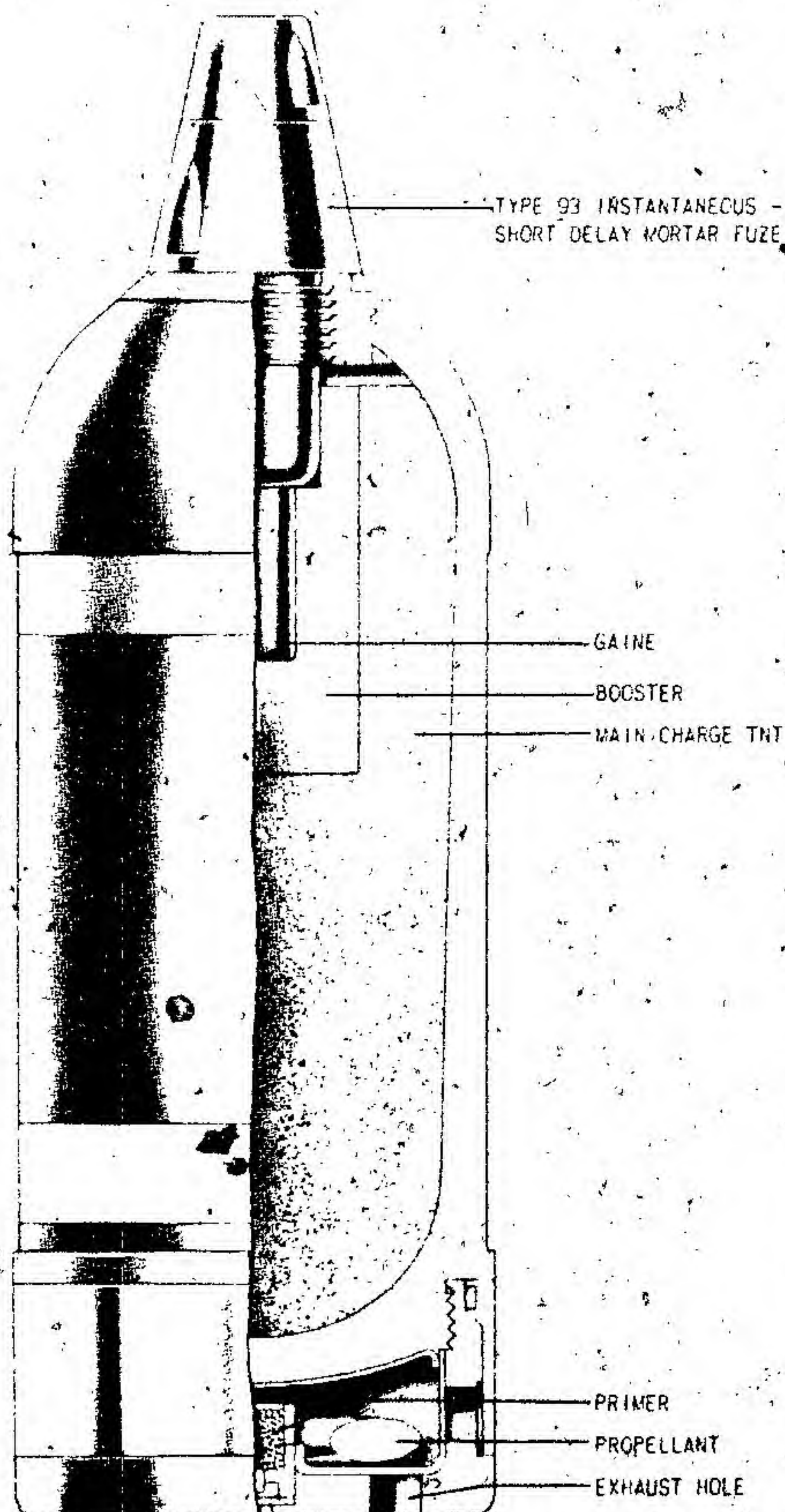


Figure 301—Type 11-Year 70-mm High-Explosive Mortar.

Type 11-Yr. 70-mm High-Explosive Mortar

Weight complete round: 4.28 pounds.

Weight main charge: 15.2 ounces.

Weight booster: 1.6 ounces.

Explosive components:

Main charge: TNT.

Booster: Picric.

Propellant: Nitrocellulose diphenylamine flaked powder.

Over-all length (without fuze): 7.12 inches.

Maximum diameter: 2.75 inches (69.8 mm).

Color: Black over-all with a red band around the nose. A yellow band is painted below the bourrelet and a white band forward of the rotating band.

Fuzing: Type 93 instantaneous short delay mortar fuze.

Weapon in which used: Type 11-year 70-mm rifled mortar.

Description: This projectile is similar in construction and operation to the type 89 50-mm H. E. mortar shell.

70-mm High-Explosive-Antiaircraft Barrage Mortar

Weight complete round: 5.19 pounds.

Weight main charge (H. E. cylinders): 12.84 grams.

Explosive components:

Main charge: RDX.

Booster: Lead azide.

Over-all-length of shell: 11.38 inches.

Maximum diameter of shell: 2.76 inches (70 mm).

Length of canisters: 6.5 inches.

Diameter of canisters: 0.75 inch.

Length of H. E. cylinders: 3.12 inches.

Diameter of H. E. cylinders: 0.69 inches.

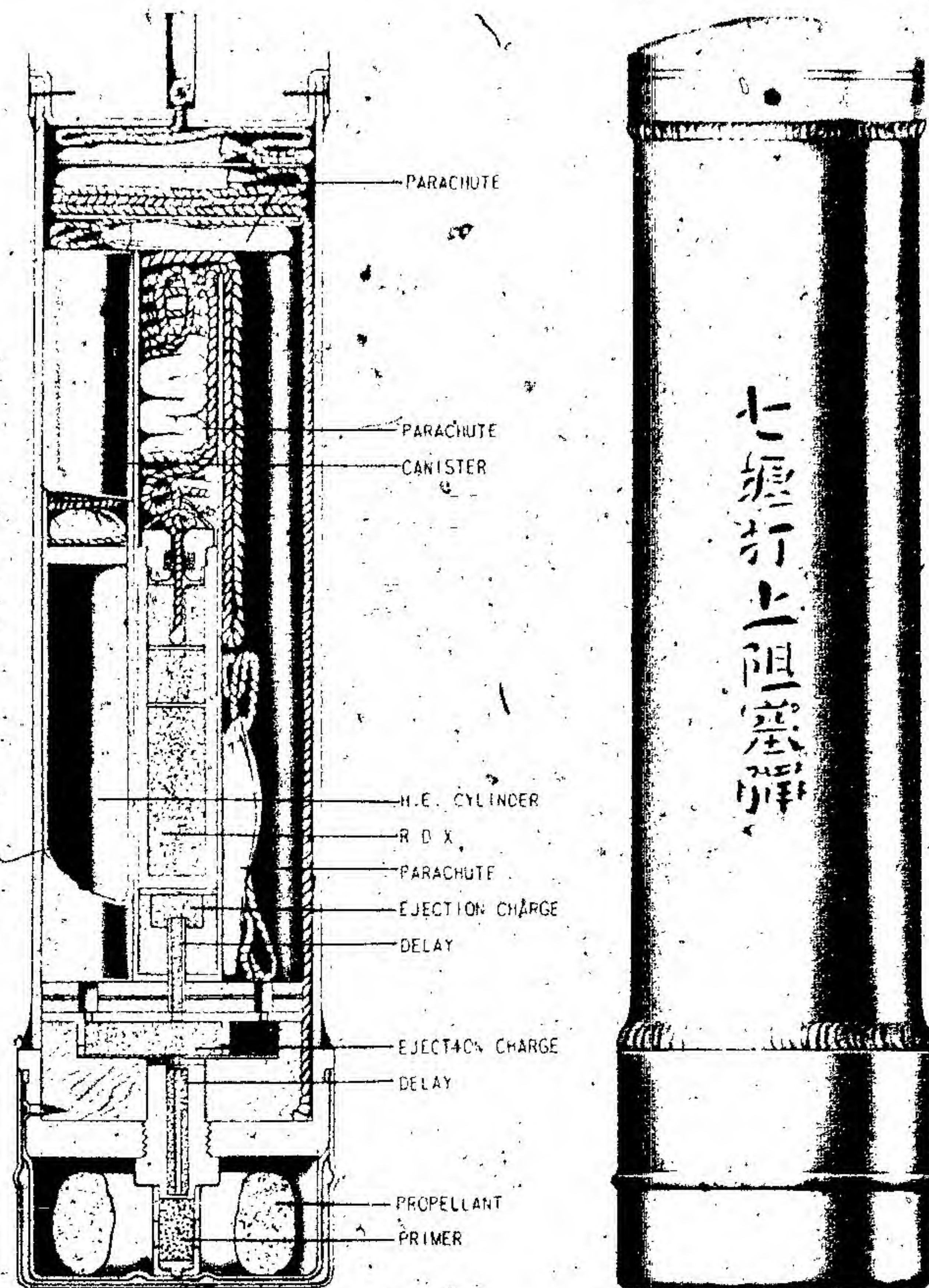


Figure 302—70-mm High-Explosive Antiaircraft Barrage Mortar.

Color: Shell, black over-all with a $\frac{1}{8}$ inch red band at nose. Canisters, zinc coated (grey).

H. E. cylinders: Black over-all with a $\frac{1}{8}$ inch red band at forward end.

Weapon in which used: 70-mm A. A. barrage mortar.

Description: This mortar shell consists of an outer shell containing seven canisters in each of which is an H. E. cylinder and parachute. A turned steel base is welded to the outer shell, and provision is made for reception of a delay train holder, a shell propellant container, and an end

cover. The delay train leads to a black-powder charge which ejects the canisters from the shell. The end cover is fitted over the propellant container and is sealed against moisture and held in position by adhesive tape. A wooden plug in a pressed steel cap closes the forward end of the shell.

The canisters contain a wooden plug in the base bored to receive a delay element and a small black powder charge to eject the H. E. cylinder from the canister. The steel H. E. cylinders are closed at the base and threaded at

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the forward end to receive a plug into which is screwed a friction cap. The explosive content is in three blocks each wrapped in a waterproof paper carton.

Parachutes are attached to the outer shell, nose cap, and each of the seven canisters and H. E. cylinders. The length of the parachute cords varies from 19 inches (canisters) to 66 inches (cylinders). The H. E. cylinder parachute lines are attached to a friction cord which passes through the friction cap. Thus, this shell, when fired, puts sixteen separate objects suspended by parachutes in the way of low-flying aircraft, seven of which will explode if hit.

Operation: The delay train to the first ejection charge is ignited by the shell propellant charge, and the first charge in turn ignites the delay trains to the second ejection charges in each of the canisters. The parachutes attached to the nose cap, outer shell, and canisters all open when the canisters are ejected and the H. E. cylinder parachutes open when they are ejected from the canisters. A plane hitting the parachute cord of any of the H. E. cylinders would cause the friction wire to be pulled through the friction cap initiating the explosive train.

Type 97 81-mm High-Explosive Mortar

Weight complete round: 7.35 pounds.

Weight main charge: 1.19 pounds.

Explosive components:

Main charge: TNT.

Booster: Picric.

Propellant:

Nitrocellulose and graphite: 58.0 percent.

Nitroglycerine: 7.1 percent.

Dinitrotoluene: 25.7 percent.

Diphenylamine: 0.5 percent.

Potassium nitrate: 8.7 percent.

Over-all length (without fuze): 11.5 inches.

Length fin assembly: 3.19 inches.

Maximum diameter at bourrelet: 3.19 inches (81 mm).

Maximum diameter tail fins: 3.19 inches.

Color: Black over-all with a red tip. A yellow band is painted before the bourrelet.

Fuzing: Type 93 instantaneous short delay mortar fuze.

Weapons in which used:

Type 97 81-mm mortar.

Type 99 81-mm mortar.

Description: The body is of one-piece streamlined construction having a threaded opening in the nose to receive the fuze-adapter ring. A steel booster cup screws (L. H.) into the lower end of the adapter ring. The booster cup is closed by a shaped aluminum container which receives the gaine of the fuze. The bourrelet is well machined and has four grooves cut in it.

The fin assembly screws into a female threaded (R. H.) opening in the base of the body. It con-

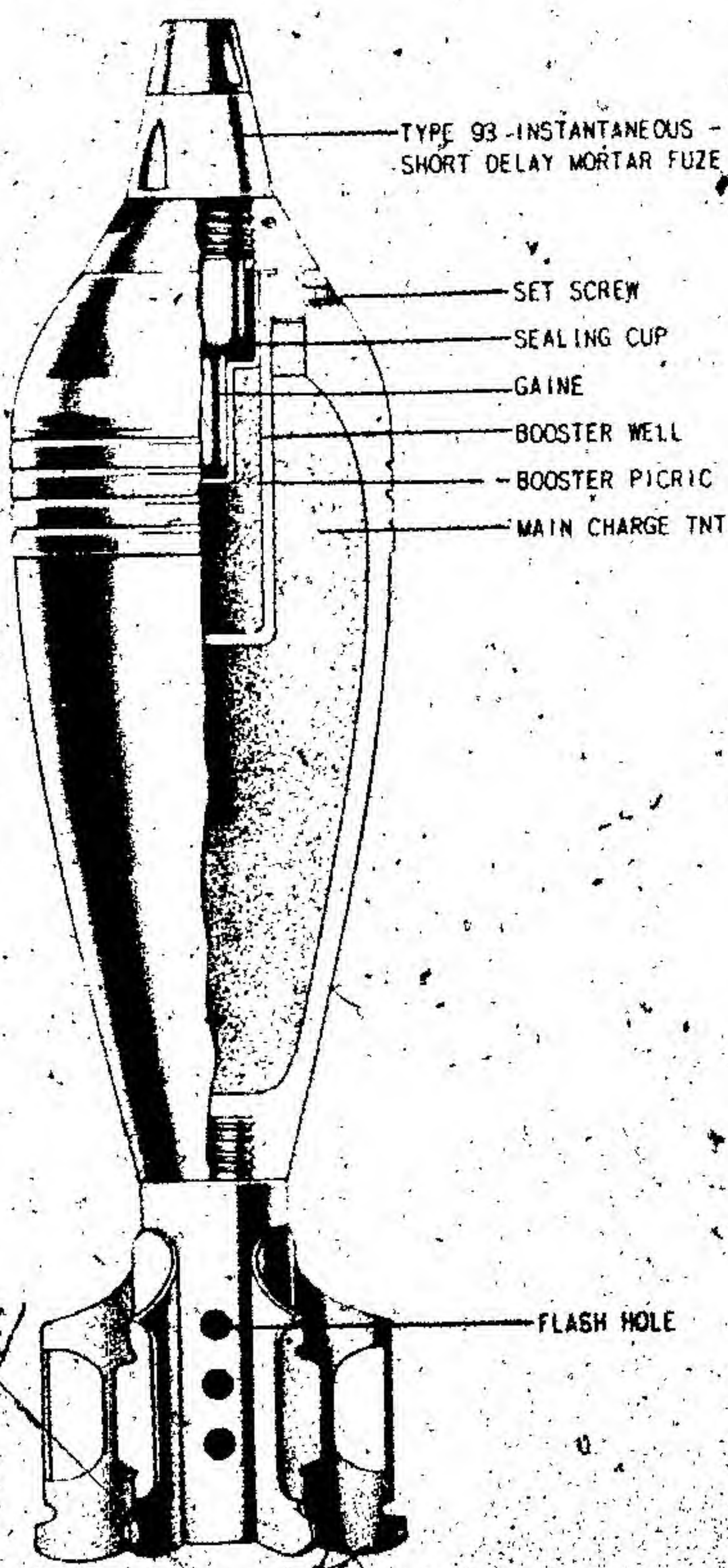


Figure 303—Type 97 81-mm High-Explosive Mortar.

sists of a male plug welded to a cylindrical steel tube. Welded to this tube are six fins shaped to receive the six silk bags containing the propellant increments. Between each set of fins are three gas escape ports for the propellant gases from the cartridge which fits inside the tube. The cartridge is held in place by a countersunk ring screwed into the end of the tube. The cartridge resembles a shotgun shell.

Type 100 81-mm High-Explosive Mortar

Weight complete round: 7.52 pounds.

Weight main charge: 1.18 pounds.

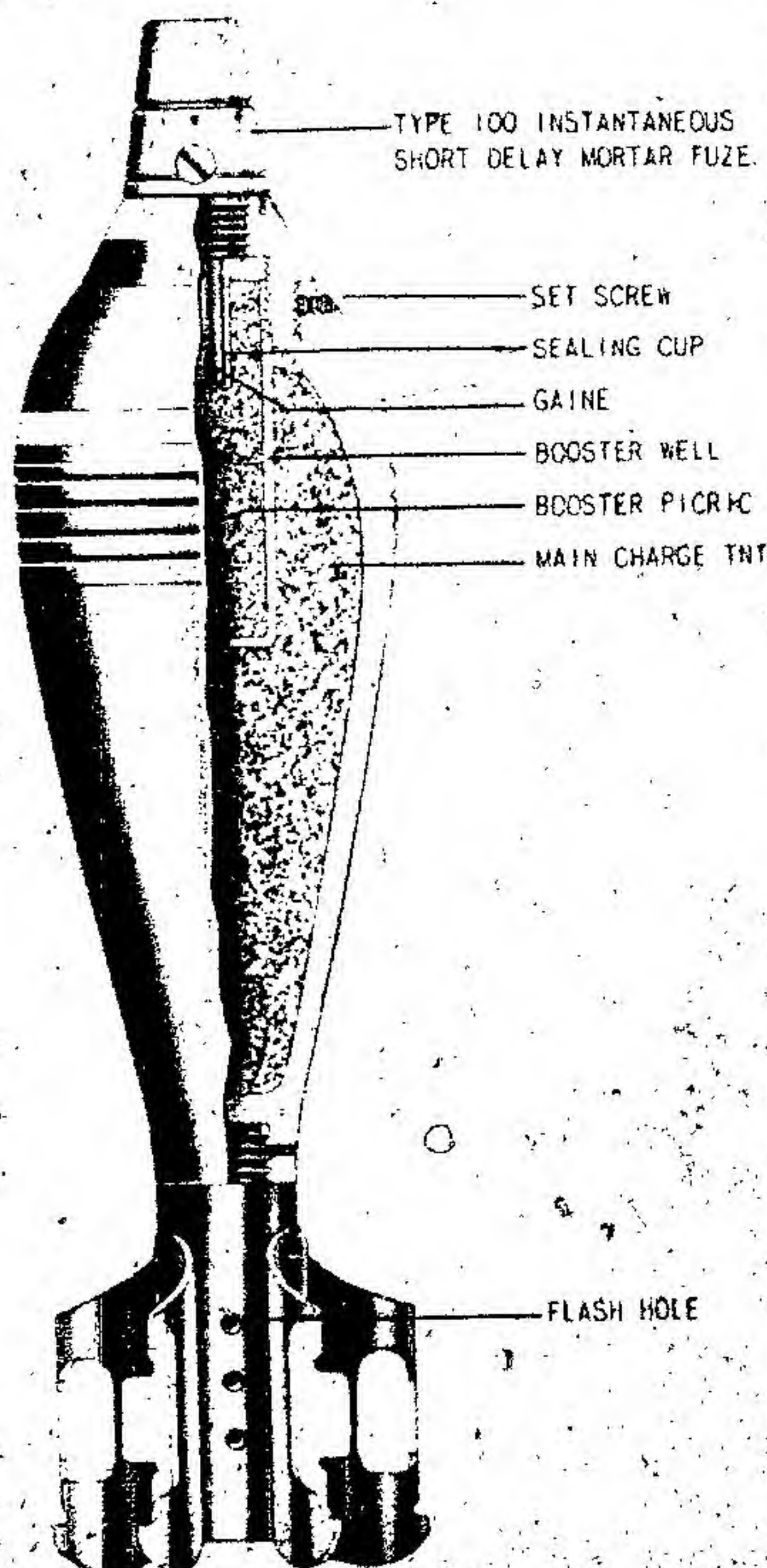


Figure 304—Type 100 81-mm High-Explosive Mortar.

Explosive components:

Main charge: TNT.

Booster: Picric.

Propellant:

Nitrocellulose and graphite: 58.0 percent.

Nitroglycerine: 7.1 percent.

Dinitrotoluene: 25.7 percent.

Diphenylamine: 0.5 percent.

Potassium Nitrate: 8.7 percent.

Over-all length (without fuze): 11.78 inches.

Length fin assembly: 3.31 inches.

Maximum diameter at bourrelet: 3.19 inches (81 mm).

Maximum diameter tail fins: 3.19 inches.

Color: Black over all with a red tip. A yellow band is painted before the bourrelet.

Fuzing: Type 100 instantaneous short-delay mortar fuze.

Weapons in which used:

Type 97: 81-mm mortar.

Type 99: 81-mm mortar.

Description: Except for minor details, this shell is similar to the Type 97 81-mm H. E. The cup to receive the fuze gaine is held in place in the booster cup by being fitted into a brass ring which screws into the fuze adapter ring above the booster cup. There is no retaining ring to hold the cartridge in the tail fin section. Instead, the cartridge is held by a friction fit.

81-mm Parachute H. E. Mortar

Weight complete round: 3.87 pounds.

Weight main charge: 4 ounces.

Explosive components:

Main charge:

RDX (1 block).

TNT (2 blocks).

Over-all length: 21.25 inches.

Length of shell (less propellant container and nose plug): 18.5 inches.

Diameter of shell body: 1.5 inches.

Diameter of fins: 3.19 inches (81 mm).

Diameter of H. E. cylinder: 1.37 inches.

Length of H. E. cylinder: 7.0 inches.

Color: Black over all with an unpainted wooden plug in the nose.

Weapon in which used: Standard 81-mm smooth-bore mortars.

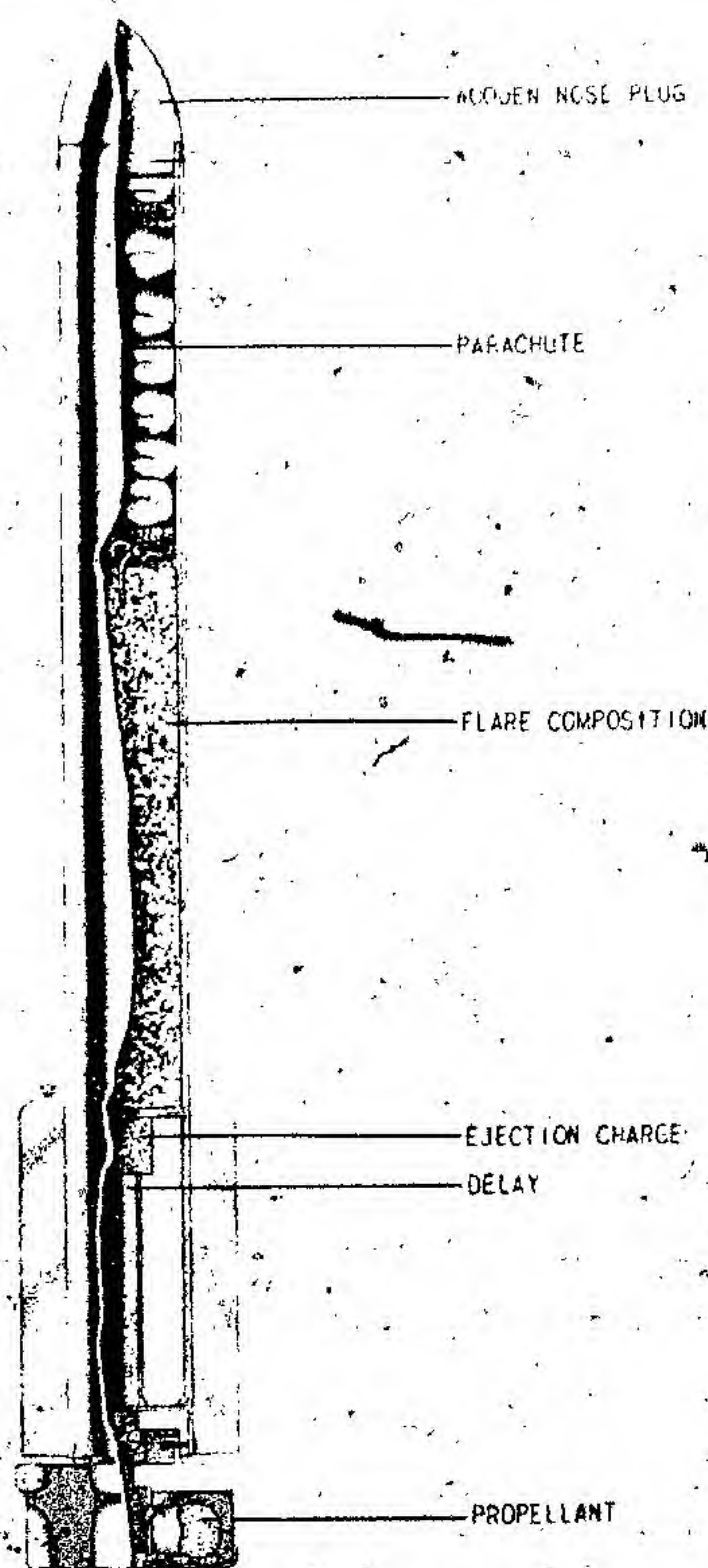


Figure 305—81-mm Parachute High-Explosive Mortar.

Description: This mortar shell is a black steel tube with an ogival wooden block sealing the forward end. Six fins which give the shell an 81 mm diameter are spot welded along the after part of the tube. A steel disc drilled through the center for the delay lead-in is welded to the tube $\frac{1}{2}$ inch from the base. Forward of the disk is a 5-inch wooden block through the center of which runs the 12-second black powder delay element. The forward end of the wooden block contains the ejection charge. The H. E. cylinder and parachutes are located forward of the ejection charge. The cylinder consists of a steel case, a central tube containing the 45-second self-destruction delay train, a friction igniter, and three cylindrical explosive blocks fitted around the central tube.

The booster fits in the forward block. The parachute which supports the cylinder is secured to a small fixed U-bolt on the cylinder by nine short (13-inch) shrouds. A second parachute above the first is secured to the friction igniter by a line 32 feet 4 inches long. This line leads through a central hole in the lower parachute.

The tinned steel propellant container is 81 mm in diameter and 1 inch deep. A neck on the container cover fits into the base of the mortar shell and is secured by three small screws passing through the sides of the shell and the neck of the cover.

Operation: When the shell is fired, the flash from the black powder primer ignites the propellant and the 12-second delay train. Setback shears the small screws securing the propellant container

to the shell, and when the force of the propellant is expended the container falls free. Twelve seconds after firing, the delay train ignites the ejection charge forcing the H. E. cylinder and parachutes out the forward end of the shell. The 45-second self-destroying delay train is also ignited by the

ejection charge. Planes striking the 32 foot parachute cord which is attached to the igniter will cause it to explode the H. E. cylinder. After 45 seconds, the self-destroying element detonates the cylinder.

81-mm Parachute H. E. Smoke Mortar

Weight complete round: No data.

Weight main charge: No data.

Explosive components: Main charge: Tetryl.

Over-all length: 21.87 inches.

Length of shell (less propellant container and nose plug): 19.1 inches.

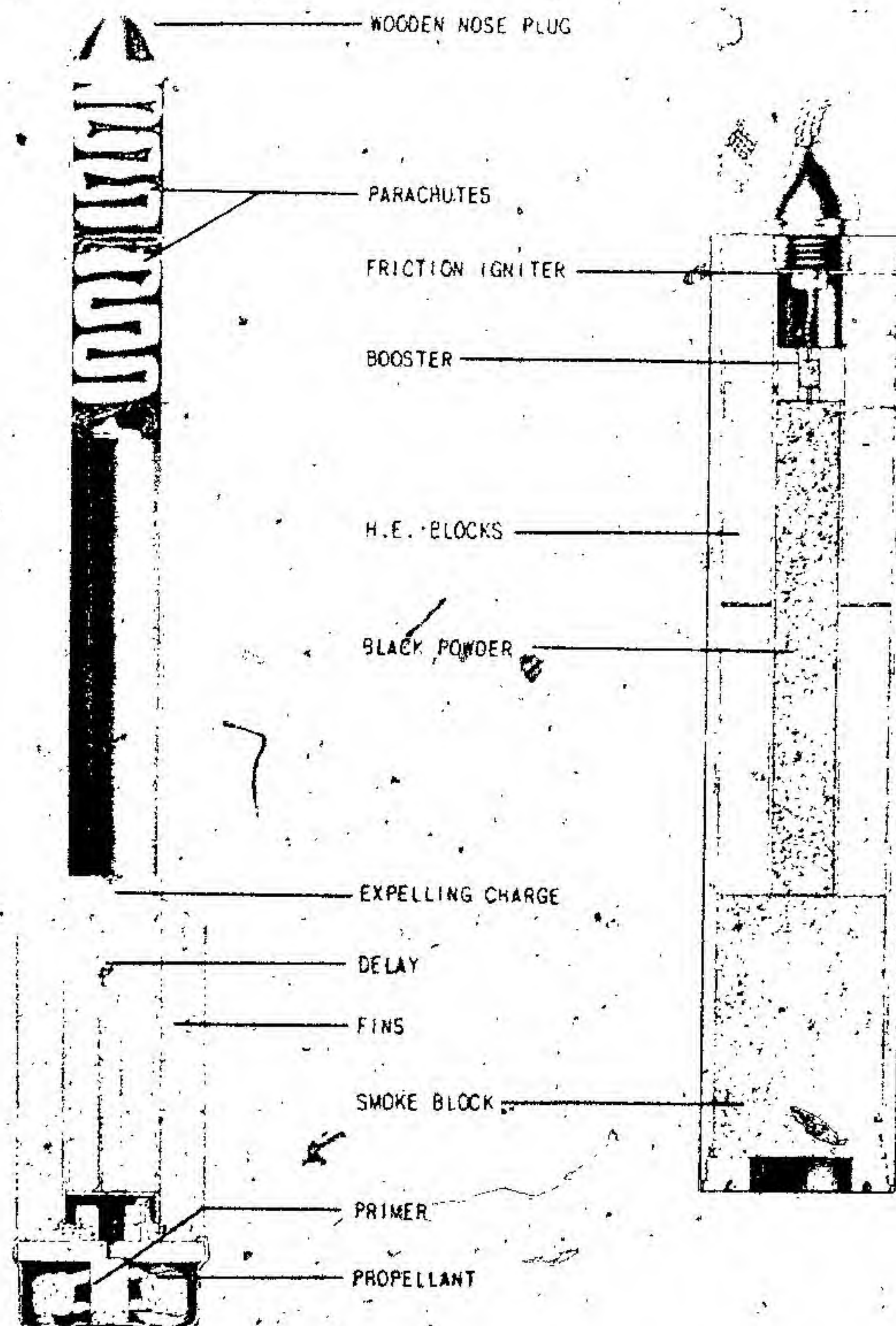


Figure 306—81-mm Parachute High-Explosive Smoke Mortar.

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Diameter of shell body: 1.5 inches.

Diameter of fins: 3.19 inches (8.1 mm).

Color: Unpainted galvanized iron with a yellow wooden nose and a green band around the body.

Description: This shell is similar to the H. E. round except that there is a smoke pellet in the bottom of the suspended cylinder. Above the smoke pellet are two pellets of tetryl with a black powder delay train running through the middle. As with the H. E. round, the line to the upper

parachute is attached to a pull igniter and, if pulled before the self-destructing feature operates, will detonate the charge.

Operation: The operation is similar to the H. E. round except that the expelling charge ignites the smoke flare pellet, which burns about 53 seconds and which then ignites the short delay train which burns seven seconds before the self-destructing element functions.

81-mm Parachute-Flare Mortar

Weight complete round: 4.87 pounds.

Weight flare composition: 409 grams.

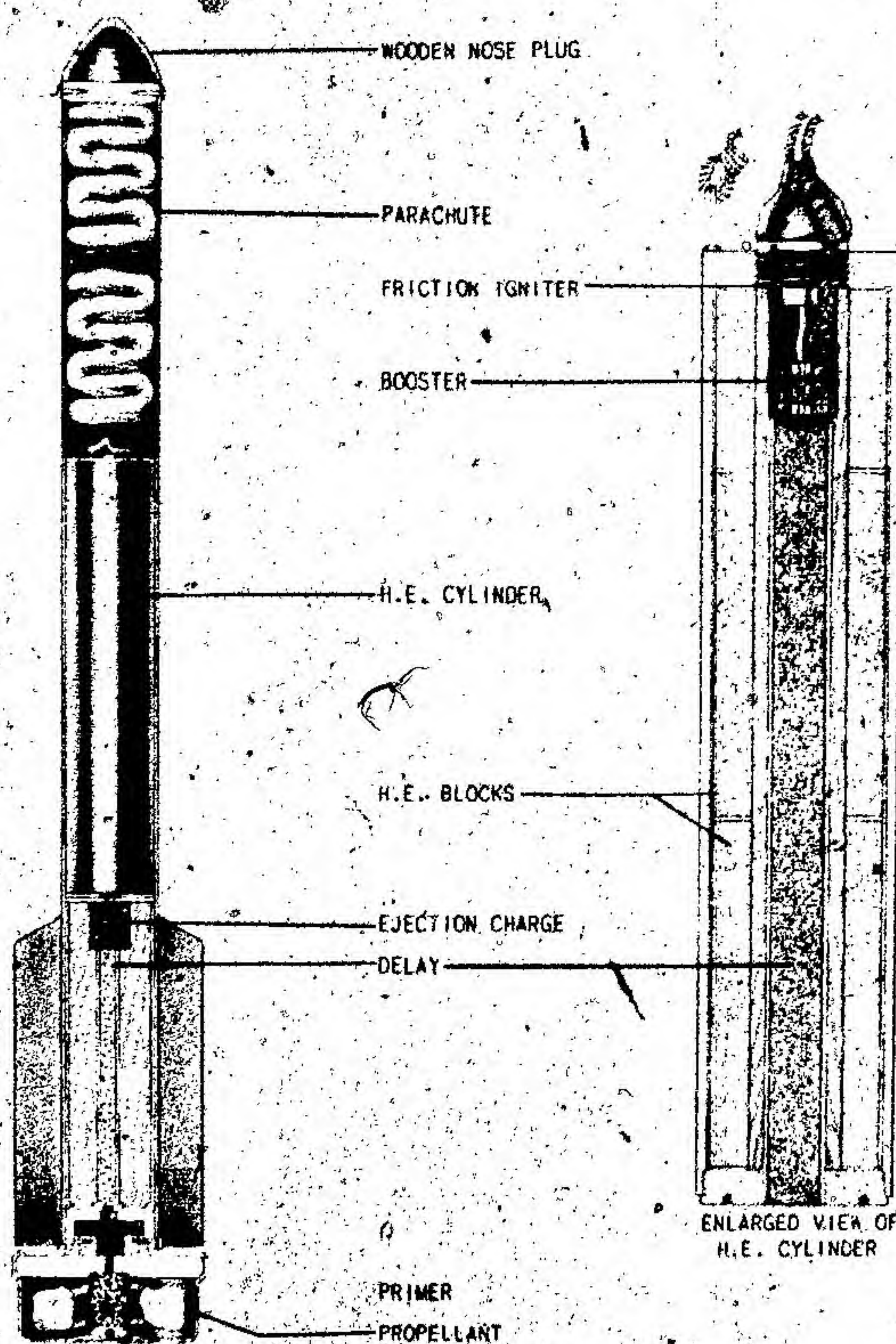


Figure 307—81-mm Parachute-Flare Mortar.

Explosive components:

Flare composition: No data.

Over-all length: 22.25 inches.

Length of shell (less propellant container and nose plug): 18.75 inches.

Diameter of shell body: 1.75 inches.

Diameter of fins: 3.19 inches (81 mm).

Diameter of flare cylinder: 1.37 inches.

Length of flare cylinder: 7.75 inches.

Color: Unpainted galvanized steel body with a red wooden plug in the nose.

Weapon in which used: Standard 81-mm smooth-bore mortars.

Description: This mortar shell resembles in construction the 81-mm H. E. parachute mortar shell; the only differences being in dimensions. A thin sheet-metal tube containing the flare composition is located before the ejection charge. Two parachutes are packed in an inner sleeve 5.5 inches long made in two longitudinal half sections and are attached by means of 14-inch and 15-foot 3-inch cords, respectively, to an eyebolt threaded into the forward end of the metallic flare composition. The wooden nose plug is secured to the outer shell by two small nails.

Operation: The operation of this shell is the same as the 81-mm H. E. parachute mortar shell. The ejection charge ignites the flare composition as it ejects the flare cylinder from the shell.

Type 94 90-mm High-Explosive Mortar.

Weight complete round: 11.8 pounds.

Weight main charge: 2.35 pounds.

Explosive components:

Main charge: TNT.

Booster: Picric (presumed).

Over-all length (without fuze): 15.83 inches.

Length fin assembly: 4.02 inches.

Maximum diameter at bourrelet: 3.54 inches (90 mm).

Maximum diameter tail fins: 3.54 inches.

Color: Black over all with a red tip and a yellow band before the bourrelet.

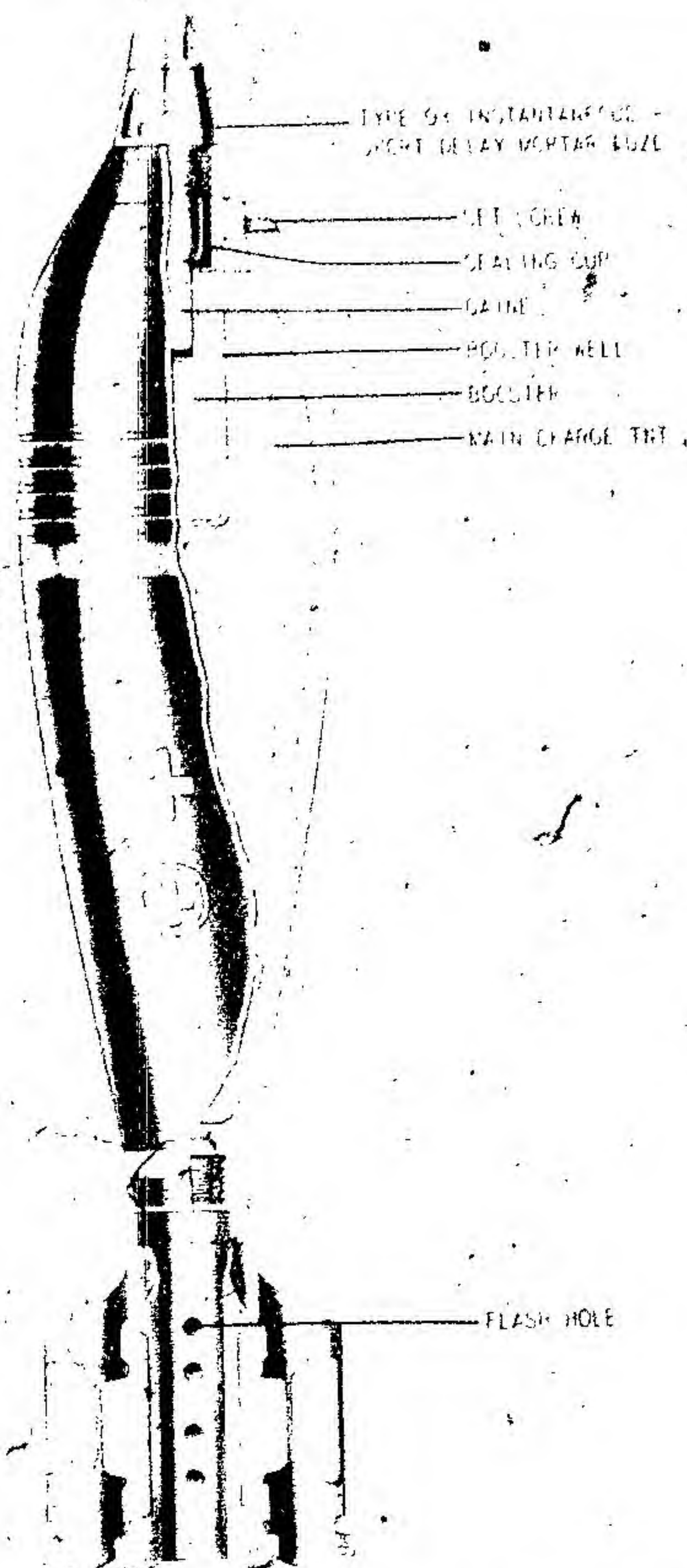


Figure 308—Type 94 90-mm High-Explosive Mortar.

Fuzing: Type 93 instantaneous short-delay mortar fuze.

Weapons in which used:

Type 94: 90-mm mortar.

Type 97: 90-mm mortar.

Description: This shell is similar in construction to the type 97 81-mm mortar shell.

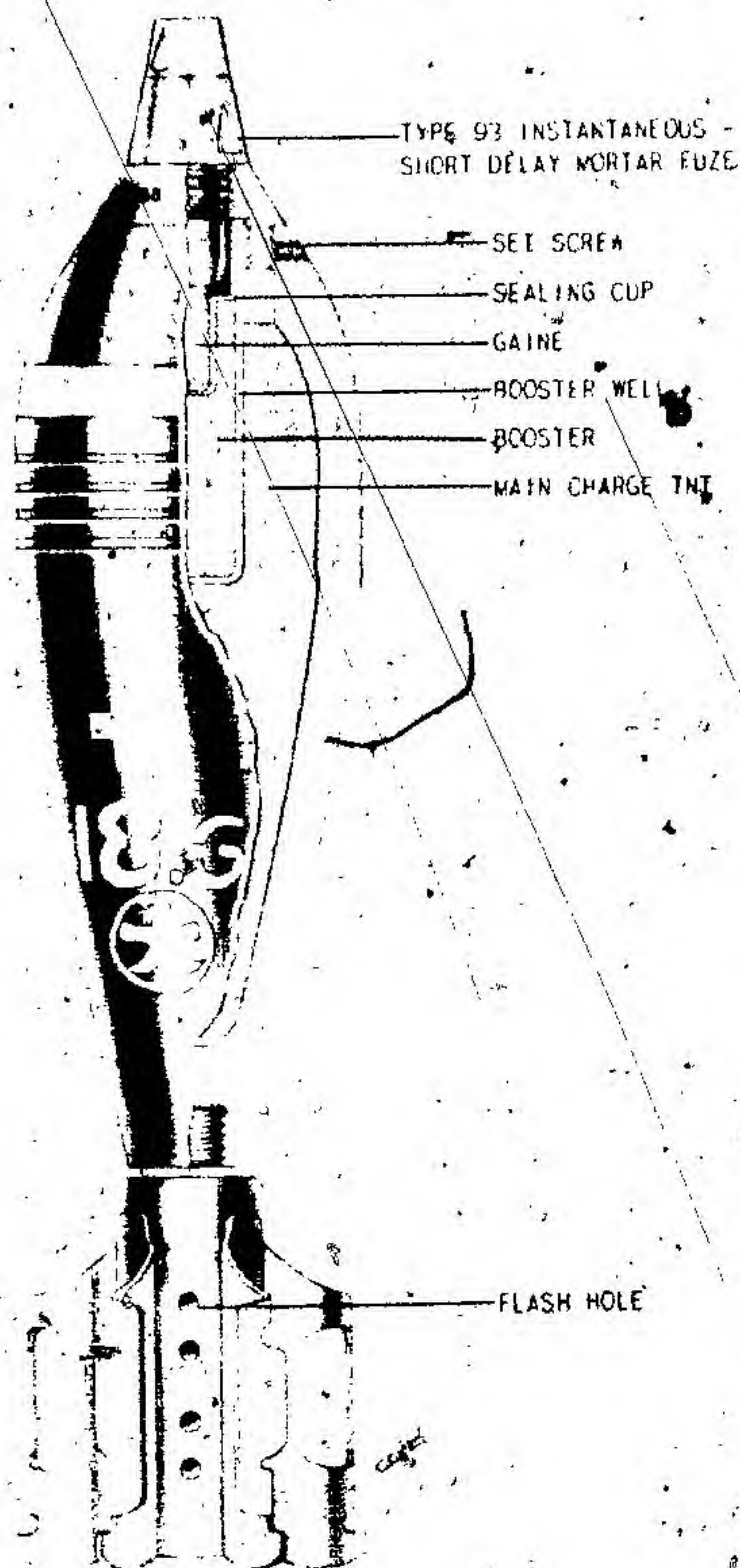


Figure 309—Type 94 90-mm Semi-Steel High-Explosive Mortar.

Type 94 90-mm Semisteel H. E. Mortar

Weight complete round: 11.5 pounds.

Weight main charge: No data.

Explosive components:

Main Charge: TNT.

Booster: No data.

Propellant: No data.

Over-all length (without fuze): 14.25 inches.

Length fin assembly: 4.0 inches.

Maximum diameter at bourrelet: 3.54 inches (90-mm).

Maximum diameter of fins: 3.54 inches.

Color: Black over all with a red tip and a green band before the bourrelet.

Fuzing: Type 93 instantaneous short-delay mortar fuze.

Weapons in which used:

Type 94: 90-mm mortar.

Type 97: 90-mm mortar.

Description: This shell is similar in design to the type 94 90-mm H. E. shell, except that it is made of low-grade or semisteel instead of high-grade steel.

Type 94 90-mm Incendiary Mortar

Weight complete round: 11.6 pounds.

Weight incendiary mixture: 2.2 pounds.

Weight burster charge: 2.75 ounces.

Explosive components:

Burster Charge: No data.

Propellant: No data.

Incendiary filling: Phosphorus, carbon disulphide, and 40 cylindrical rubber pellets.

Over-all length (without fuze): 15.9 inches.

Length fin assembly: 4.0 inches.

Maximum diameter at bourrelet: 3.54 inches (90-mm).

Maximum diameter of tail fins: 3.54 inches.

Color: Black body with blue bands around the nose, a yellow band half way between the bourrelet and tail and white band at junction of body, and tail.

Fuzing: Type 93 instantaneous short-delay mortar fuze (presumed).

Weapons in which used:

Type 94: 90 mm mortar.

Type 97: 90 mm mortar.

Description: This shell is similar in design to the type 94 90-mm H. E. mortar shell, with the following exceptions:

1. An enlarged booster cup threads into the nose of the projectile. It contains a well for the lower fuze body and detonator, a burster charge, and a wooden block.

2. A fuze adapter threads into the forward end of the booster cup.

Remarks: A shell of similar construction, weight, and measurements contains a filling of diphenylcyanarsine (DC). The shell is painted black over-all and has a red band around the nose with a blue band adjacent to it. There is a yellow

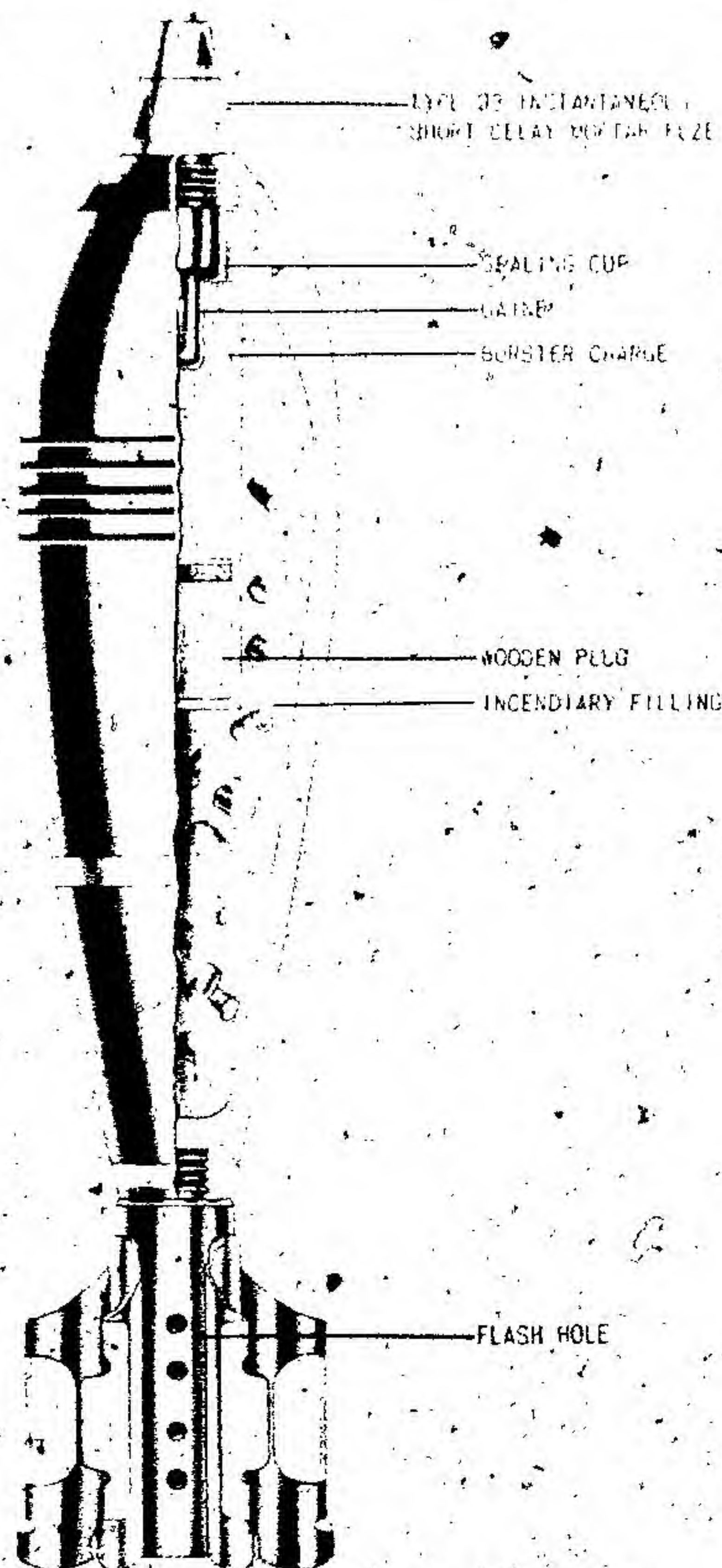


Figure 310—Type 94 90-mm Incendiary Mortar.

band aft of the bourrelet and a red band half way between the bourrelet and the tail. There is a white band at the junction of the shell body and tail.

Type 2 120-mm High-Explosive Mortar

Weight complete round: 26.5 pounds.

Weight main charge: 6.0 pounds.

Explosive components:

Main charge: TNT.

Booster: RDX and wax.

Over-all length (without fuze): 22.5 inches.
Length fin assembly: 6.2 inches.
Maximum diameter at bourrelet: 4.7 inches (120 mm).
Maximum diameter of tail fins: 4.7 inches.
Color: Black over all with a red tip and a yellow band forward of the bourrelet.
Fuzing: Type 100 instantaneous short delay mortar fuze.
Weapons in which used: Type 2, 120-mm mortar.

Description: The body section of this shell is similar to that of the standard Army finned mortar types but the tail fin section resembles that of the Navy 81-mm H. E. The 12 fins are welded to the

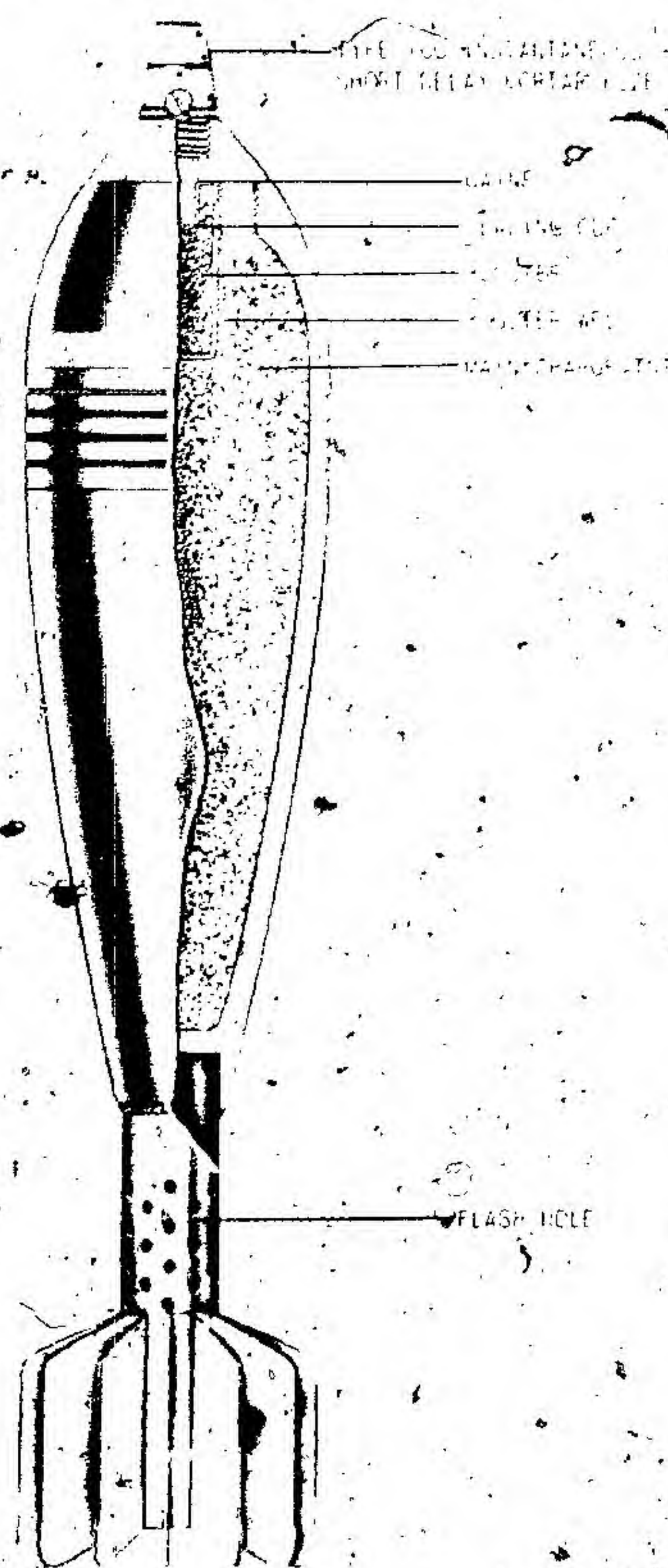


Figure 311—Type 2 120-mm High-Explosive Mortar.

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propellant tube which is welded to the base of the body. The forward end of the tube has 42 escape ports arranged in 6 rows to allow the flash to pass from the primary cartridge to the propellant increments. The initial charge is contained in a cardboard case which fits inside the propellant tube and is held in place by a steel plug fitted with the primer cap. The main propelling charge is contained in 6 doughnut shaped silk bags which are split so that they can be slipped around the propellant tube above the tail fins and over the flash ports.

Remarks: A variation of this shell has been found with the tail section threaded into the body and secured by a pin instead of being welded to the body.

Type 96 150-mm High-Explosive Mortar

Weight complete round: 58.06 pounds.

Weight main charge: 12.9 pounds.

Explosive components:

Main charge: TNT.

Booster: Picric.

Propellant:

Nitrocellulose and graphite: 58.0 percent.

Nitroglycerine: 7.1 percent.

Dinitrotoluene: 25.7 percent.

Diphenylamine: 0.5 percent.

Potassium nitrate: 8.7 percent.

Over-all length (without fuze): 28.75 inches.

Length fin assembly: 7.81 inches.

Maximum diameter at bourrelet: 5.9 inches (150 mm).

Maximum diameter of tail fins: 5.87 inches.

Color: Black over all with a red tip, a yellow band below the bourrelet, and a white band before the tail-fin assembly.

Fuzing: Type 93 instantaneous short-delay mortar fuze.

Weapon in which used: Type 96 50-mm smooth-bore mortar.

Description: The construction of this shell is similar to that of the type 97 81-mm H. E. mortar shell.

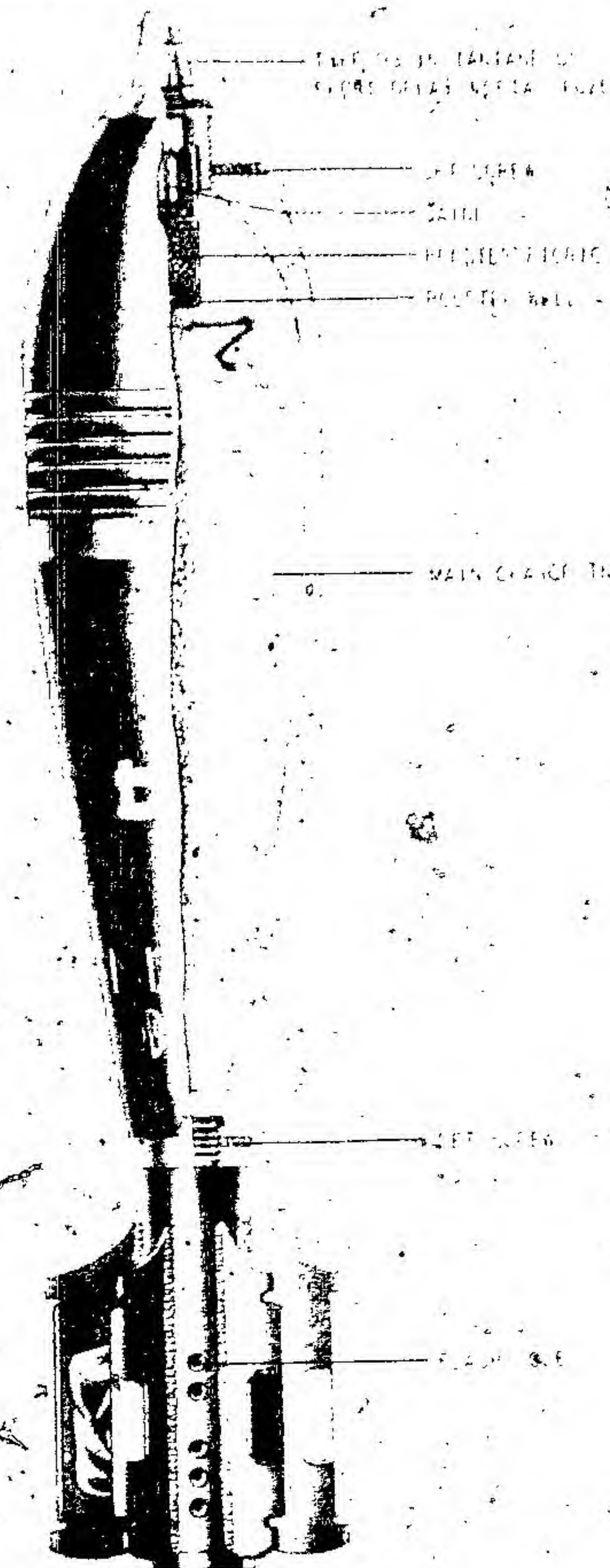


Figure 312—Type 96 150-mm High-Explosive Mortar.

Type 97 150-mm High-Explosive Mortar

Weight complete round: 43.5 pounds.

Weight main charge: 8.98 pounds.

Explosive components:

Main charge: TNT.

Booster: RDX and wax.

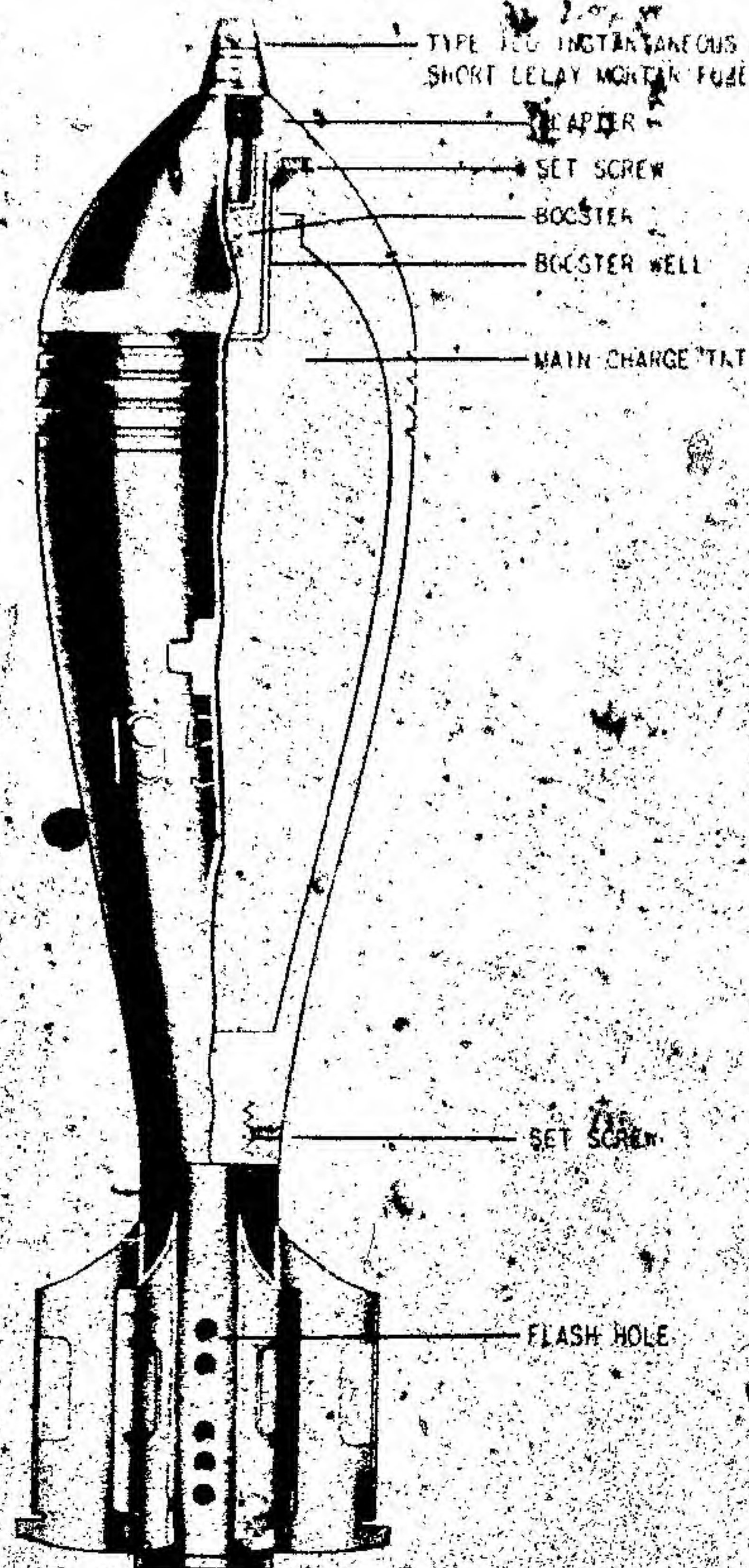


Figure 313—Type 97 150-mm High-Explosive Mortar.

Propellant:

Nitrocellulose and graphite: 58.0 percent.
 Nitroglycerine: 7.1 percent.
 Dinitrotoluene: 25.7 percent.
 Diphenylamine: 0.5 percent.
 Potassium nitrate: 8.7 percent.

Over-all length (without fuze): 23.7 inches.

Length fin assembly: 6.7 inches.

Maximum diameter at bourrelet: 5.9 inches (150 mm).

Maximum diameter tail fins: 5.87 inches.

Color: Black over all with a red nose tip and a yellow band before the bourrelet.

Fuzing: Type 100 instantaneous short-delay mortar fuze.

Weapon in which used: Type 97 150-mm smooth-bore mortar.

Description: Except for its shorter size, this projectile is similar in construction to the type 96 H. E. long round.

32-cm Spigot-Type Mortar

Weight complete round: 737 pounds.

Weight nose section loaded: 172 pounds.

Weight center section loaded: 215 pounds.

Weight tail section loaded: 350 pounds.

Weight main charge: 103 pounds.

Explosive components:

Main charge: Picric.

Booster: P. E. T. N.

Propellant: Black powder and nitrocellulose.

Over-all length (without fuze): 61 inches.

Length nose section (less threaded portion): 13.75 inches.

Length center section (less threaded portion): 10.92 inches.

Length tail section: 36.31 inches.

Body diameter: 12.62 inches (320 mm).

Inside diameter of tail section: 10.12 inches.

Maximum diameter of tail fins: 25.25 inches.

Length tail fins: 21.4 inches.

Color: The projectile is painted black over-all with a red nose tip and a yellow band around the rear of the nose section.

Fuzing: Type 98 Interior Fuze.

Weapons in which used: Special spigot-type projector.

Description: The projectile, which resembles a bomb, is made in three parts. The nose section, ogival in shape, is externally threaded at its base to screw into the center section and is internally threaded to receive a steel base plate. It has a booster cup fitted with a fuze adapter screwed into the nose.

The center section is a short cylinder, solid on the base and threaded externally to screw into the tail section. It is closed at the forward end, with a steel plate having a fuze adapter ring, fitted with a booster cup, welded in its center.

The tail section screws onto the center section and has a gradual taper toward the rear from a

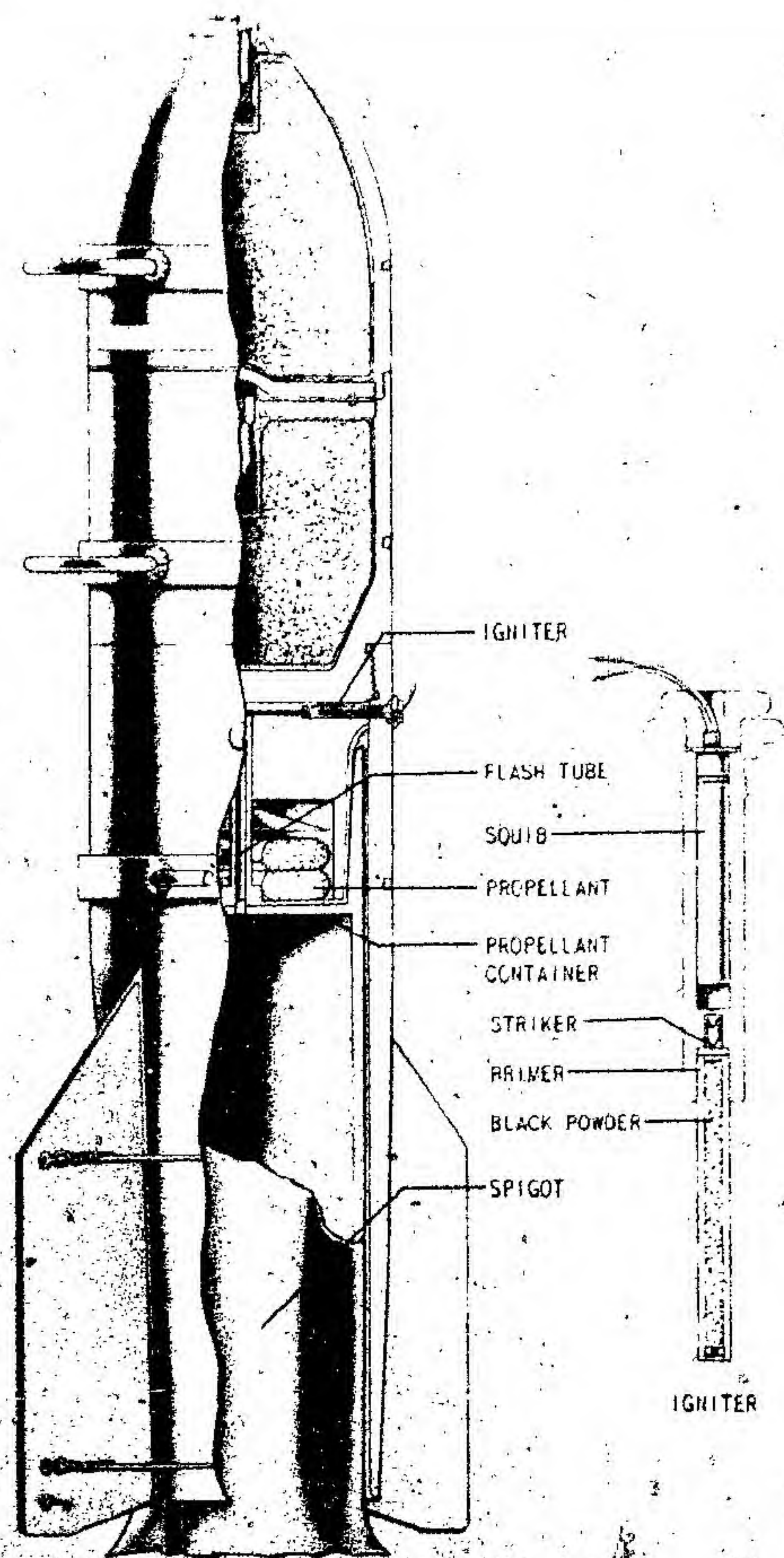


Figure 314—32-cm Spigot-Type Mortar.

point 14.5 inches below the forward end. It is hollowed out to fit over the projector tube. Four sheet-steel tail fins, each braced by two stabilizing wires, are welded to the tail section.

For convenience in handling and assembling, steel bands, each fitted with two double handles, are provided. Before the firing of the projectile, the carrying bands are removed.

The propellant charge is placed in a brass pot which fits into the recessed portion of the pro-

jector tube. The charge is contained in a cardboard container having a brass flash tube passing through its vertical axis, through the brass pot, and being screwed into the spigot. There is a drilled and tapped hole near the forward end of the tail section of the projectile into which the igniter tube screws. When in position, the end of the igniter tube is in close proximity to the end of the brass flash tube which leads into the propellant charge.

Chapter 4—Section 4
ARMY PROJECTILE FUZES

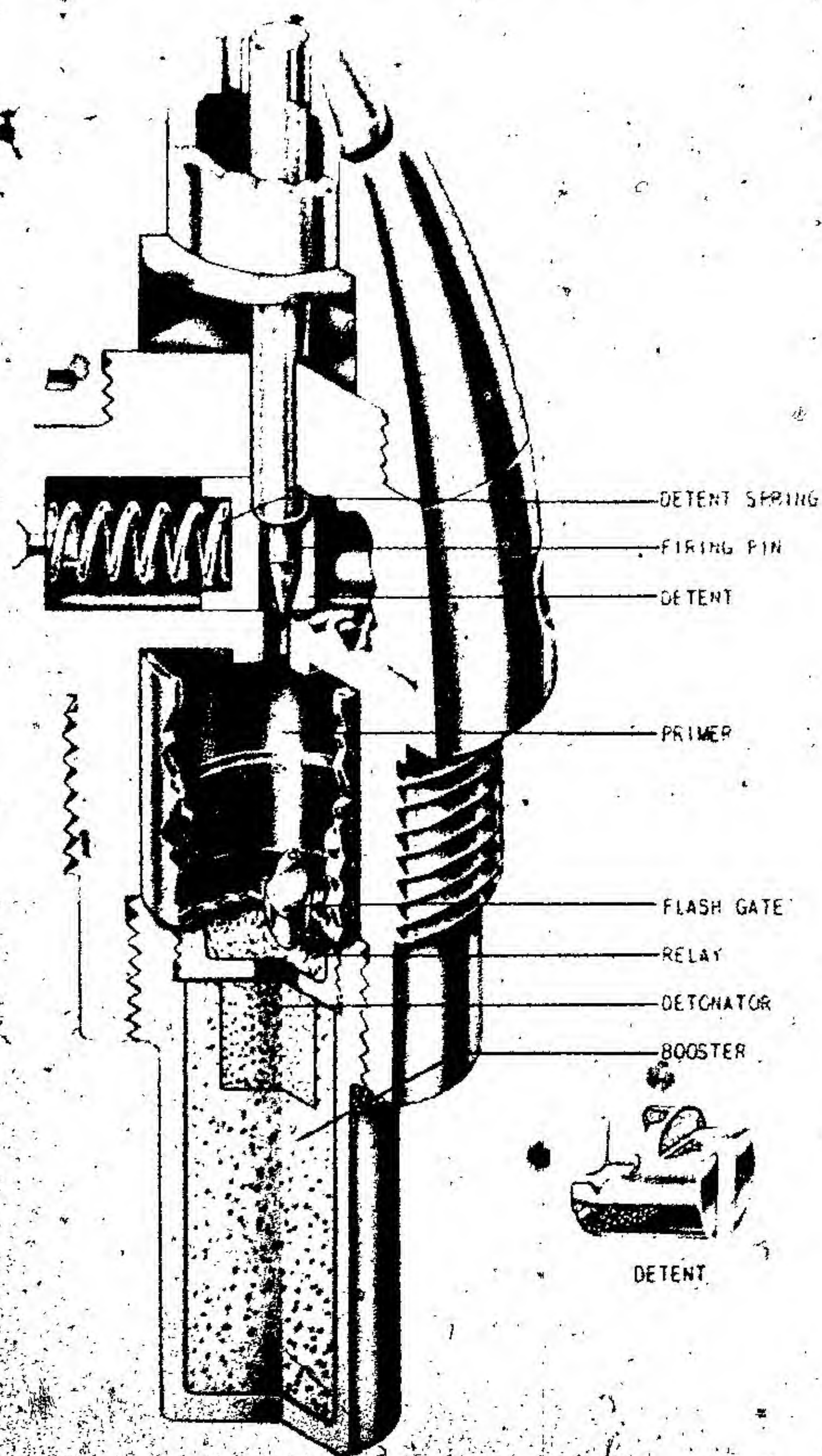


Figure 315—Type 93 Small Instantaneous Fuze.

Type 93 Small Instantaneous Fuze

Use: Ammunition for 20-mm aircraft, antitank, and antiaircraft guns; 37-mm tank and antitank guns.

Over-all length (with gaine): $1\frac{1}{8}$ inches.

Over-all length (without gaine): $1\frac{1}{8}$ inches.

Maximum diameter: $\frac{1}{4}$ inch.

Threaded length: $\frac{1}{4}$ inch.

Number of threads: 5, right-hand.

Construction: The fuze is of two-piece brass construction with an aluminum striker head. The

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lower piece houses a centrifugal detent, a primer, and a flash-hole shutter. The gaine threads into the lower piece.

Operation: The centrifugal detent, which supports the striker, is held in place by the striker and detent spring until the projectile decelerates.

Then the striker creeps forward and centrifugal force causes the detent to move out. The flash shutter is also moved out by centrifugal force and the fuze is armed. On impact the striker is driven into the primer.

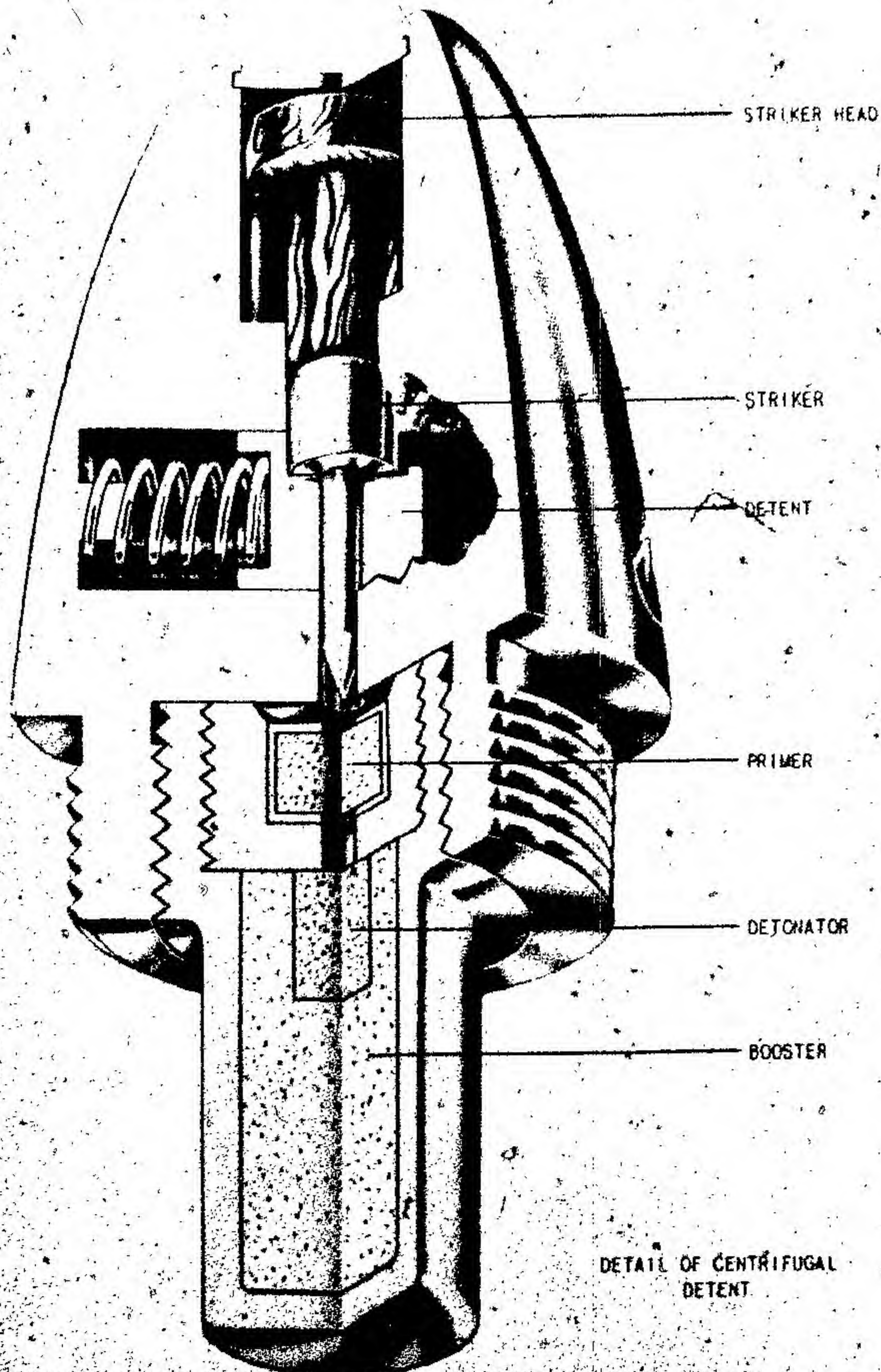


Figure 316—Type 100 Small Instantaneous Fuze.

Type 100 Small Instantaneous Fuze

Use: Ammunition for 20-mm aircraft, antiaircraft, and antitank cannon, and 37-mm tank, anti-tank, and aircraft guns.

Over-all length (with gaine): 1 1/8 inches.
Over-all length (without gaine): 1 inch.
Maximum diameter: 3/8 inch.
Threaded length: 1/4 inch.
Number of threads: 5, right-hand.

Construction: The fuze is made of brass in one piece. A centrifugal detent supports the striker. Above the striker there is a wooden striker head. The fuze is threaded internally (L. H.) to take the gaine.

Operation: The centrifugal detent, supporting

the striker, is held in place by the striker and detent spring until the projectile decelerates. Then the striker creeps forward and centrifugal force causes the detent to move out, arming the fuze. On impact the striker is driven into the primer.

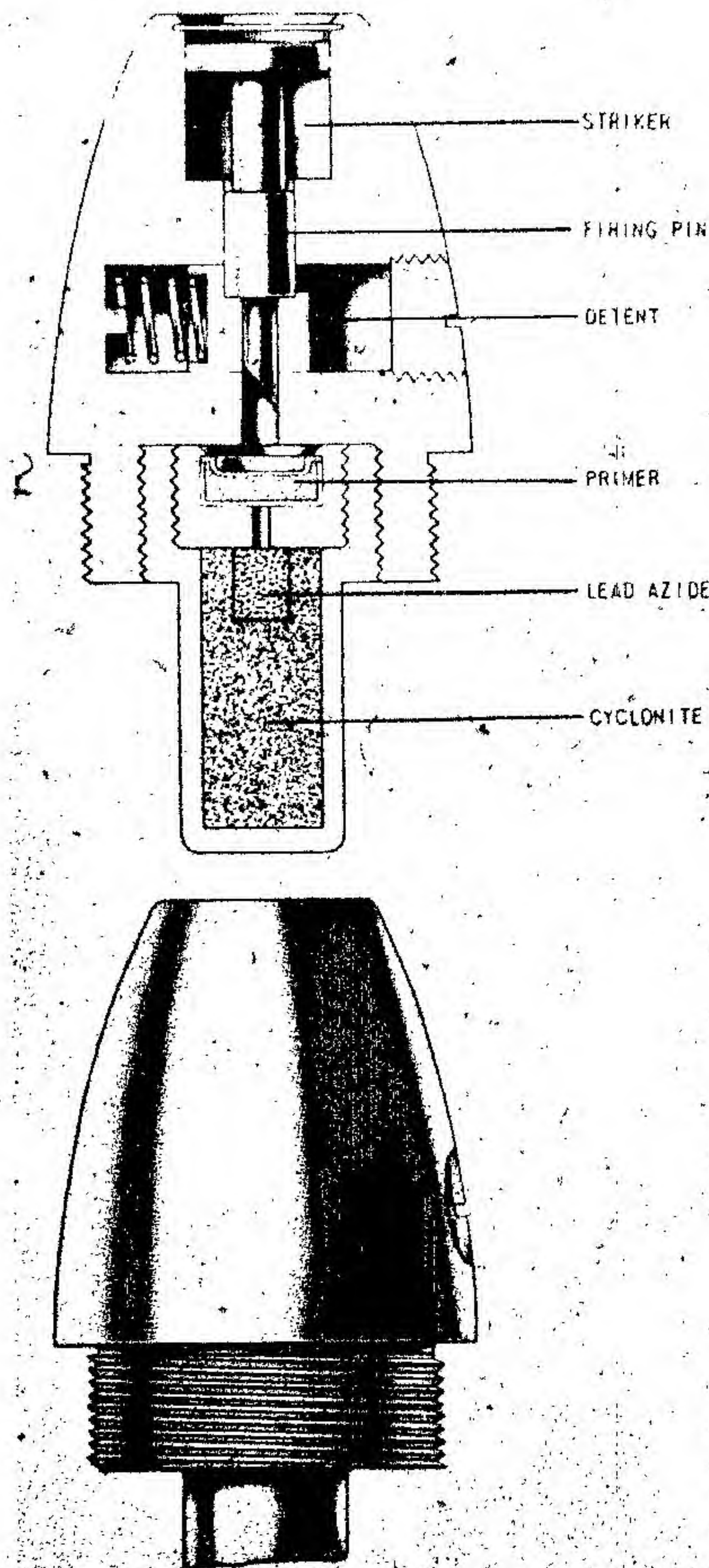


Figure 317—Type 2 Small Instantaneous Fuze.

Type 2 Small Instantaneous Fuze

Use: Ho-5 20-mm H. E. I. projectiles.

Over-all length with gaine.....	$\frac{3}{4}$ inch
Threaded length.....	$\frac{1}{2}$ inch
Number of threads.....	6

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Construction: This fuze is identical to the type 100 small instantaneous fuze except that the body of the type 100 is brass and the body of this fuze is of light metal alloy. A modification of this

fuze has the detent hole secured with a staked plug rather than a screw.

Operation: The operation is the same as the type 100 small instantaneous fuze.

Type 2 Modified Small Instantaneous Fuze

Use: 20-mm H. E. I. projectile.

Description:

Over-all length with gaine: $\frac{5}{8}$ inch.

Threaded length: $\frac{1}{4}$ inch.

Number of threads: 6.

Construction: This is an air-column fuze with a one-piece metal alloy body. Threaded into the

base of the fuze is a gaine above which is an air column sealed at the top by a closing disk.

Operation: There are no arming features in this fuze. On impact, the closing disk is crushed inward, compressing the air in the column and firing the gaine.

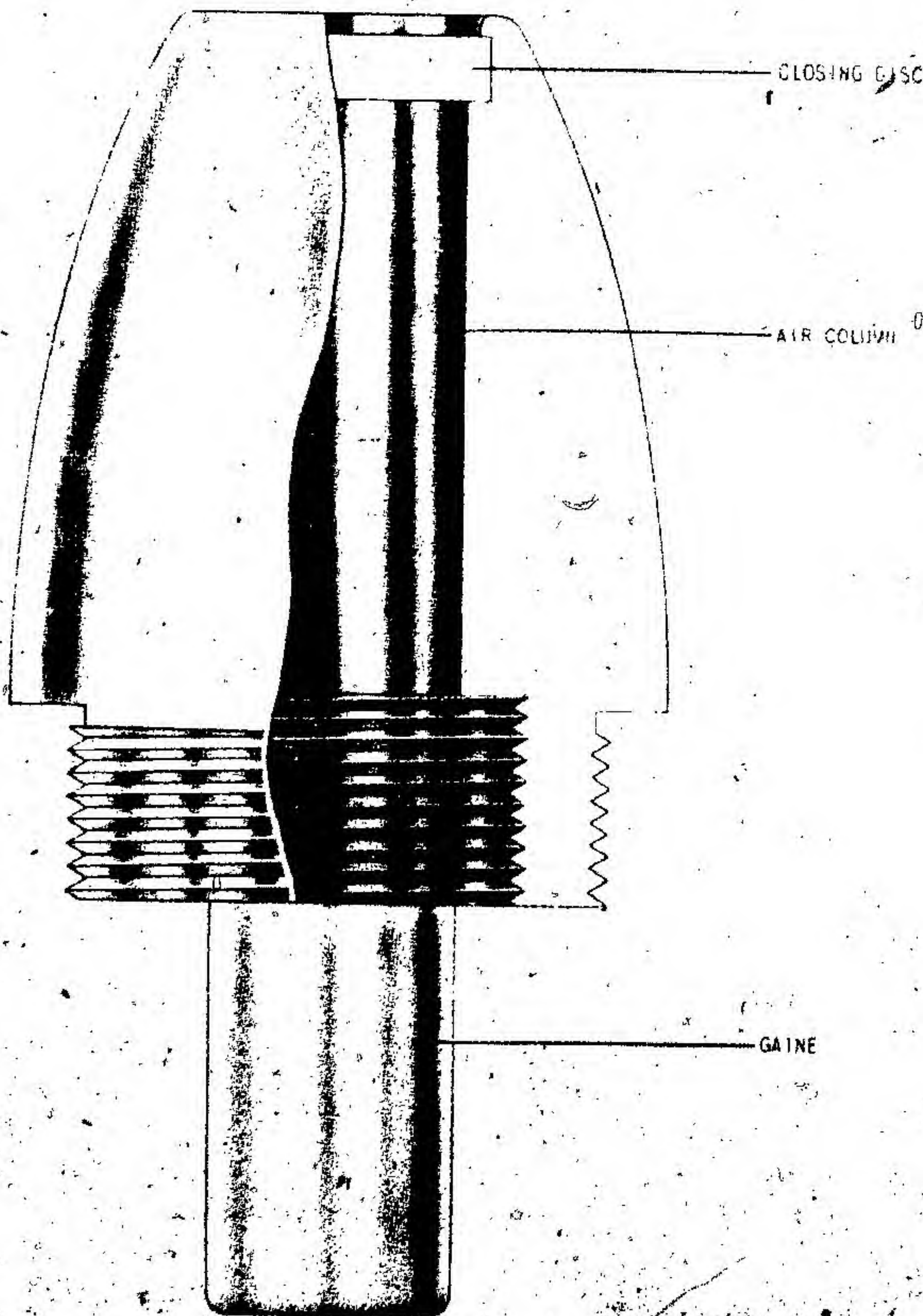


Figure 318—Type 2 Modified Small Instantaneous Fuze.

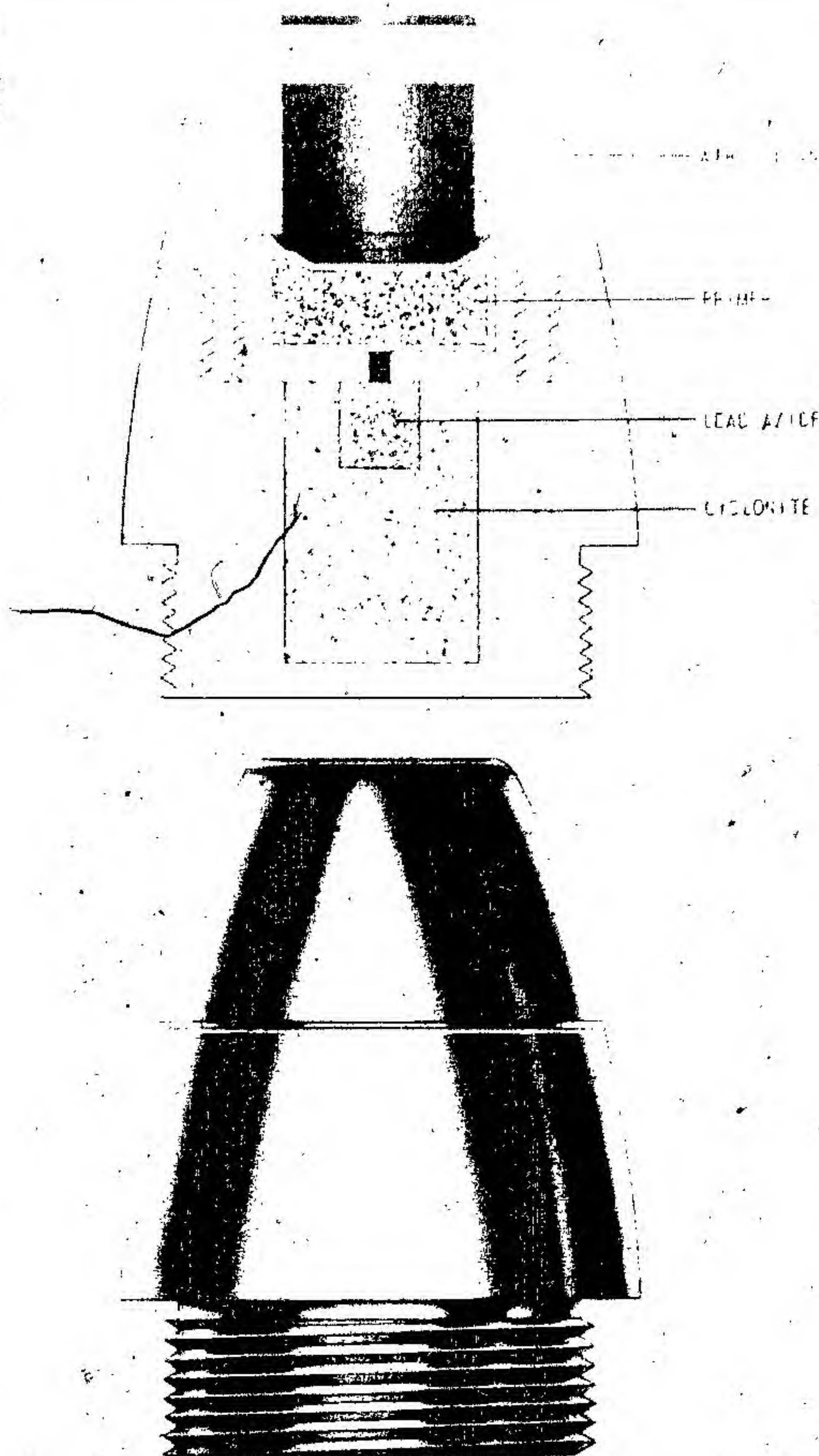


Figure 319—Type 4 Super Detonating Fuze.

Type 4 Super Detonating Fuze

Use: Ho-5 20-mm H. E. I. projectiles.

Description:

Over-all length with gaine: $6\frac{3}{4}$ inch.

Threaded length: $\frac{1}{4}$ inch.

Number of threads: 6.

Construction: This is an air-column fuze with the gaine enclosed in the fuze body. The fuze is of two-piece construction, with the upper part containing the air column and primer and the lower part containing the gaine. The inclusion

of the gaine in the fuze body leaves space for more explosive in the projectile.

Operation: There are no arming features in this fuze. On impact, the closing disk is crushed inward, compressing the air in the column and firing the gaine.

Ho 301 Impact Fuze

Use: 40-mm projectiles for the Ho 301 aircraft cannon.

Description:

Over-all length (with gaine): 1 1/8 inches.

Over-all length (without gaine): 1 1/8 inches.

Maximum diameter: 1 1/2 inches.

Threaded length: 1/4 inch.

Number of threads: 6.

Construction: The fuze body is made of one piece. The striker is supported by a centrifugal detent which is held under a shoulder of the striker by two locking centrifugal detents. The gaine threads into the bottom of the fuze.

Operation: Centrifugal force causes the locking detents to move out, thus freeing the striker detent which moves out arming the fuze. On impact the striker is driven into the primer.

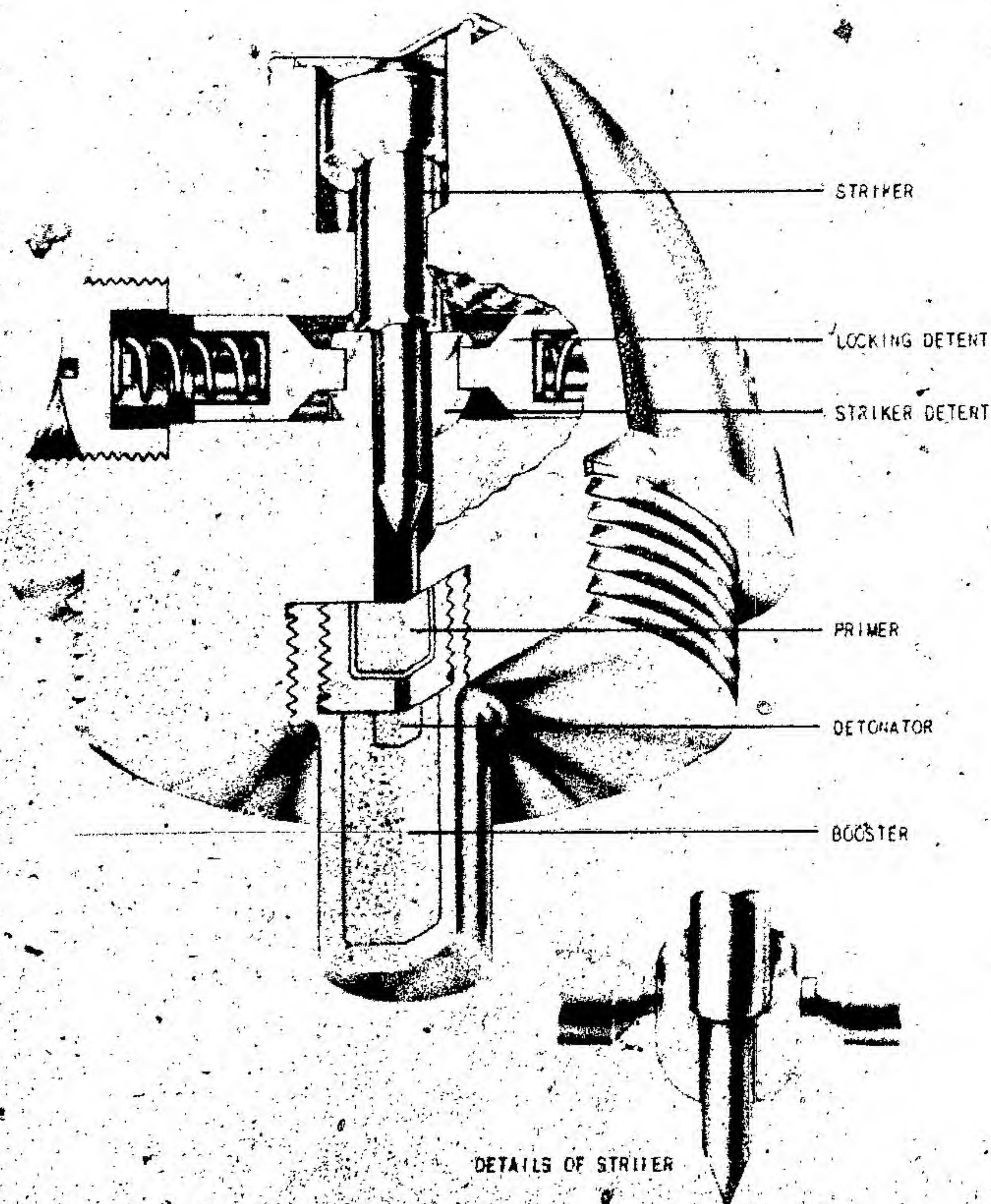


Figure 320—HO 301 Impact Fuze.

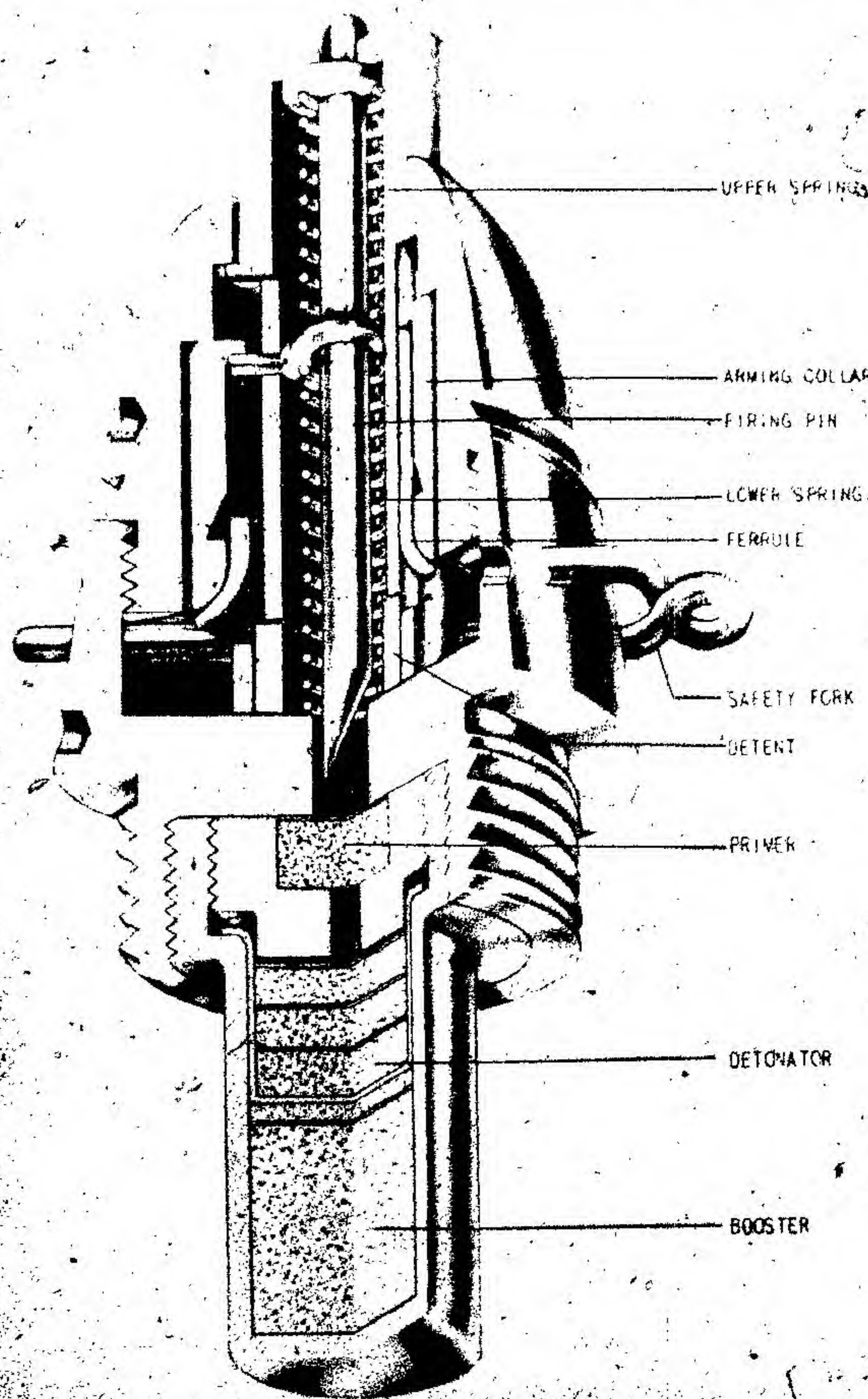


Figure 321—Type 88 Small Instantaneous Fuze.

Type 88 Small Instantaneous Fuze

Use: H. E. projectiles for the 50-mm grenade discharger.

Description:

Over-all length (with gaine): $2\frac{1}{4}$ inches.

Over-all length (without gaine): $1\frac{1}{4}$ inches.

Maximum diameter: 1 inch.

Threaded length: $\frac{1}{4}$ inch.

Number of threads: 5, right-hand.

Construction: The fuze body is of two-piece brass construction. The upper part is threaded

(R. H.) into the lower part, with the striker head protruding from the upper fuze body. The striker assembly is supported by steel wedges which rest beneath the striker sleeve and two coiled springs. The steel wedges are held in position by the lower portion of a circumferential latch spring which is fitted around the striker sleeve. An arming collar surrounds a portion of the striker assembly and the upper portion of the latch spring. This collar is supported by the lower of two striker supporting coiled springs and the latch spring.

Operation: When the projectile is fired, setback forces the arming collar down until the notch on the inner side of the collar engages the latch springs. As the projectile decelerates, the lower spring forces the arming collar up, thus pulling the latch spring collar free of the wedges. Centrifugal force moves the wedges out, leaving the striker supported only by the coiled springs. On impact, the striker is driven down into the primer.

Remarks: Both brass and steel bodies have been recovered.

Type 88 Short-Delay (Gun and Howitzer Mortar) Fuze

Use:

Gun type: H. E. projectiles for 57-mm tank

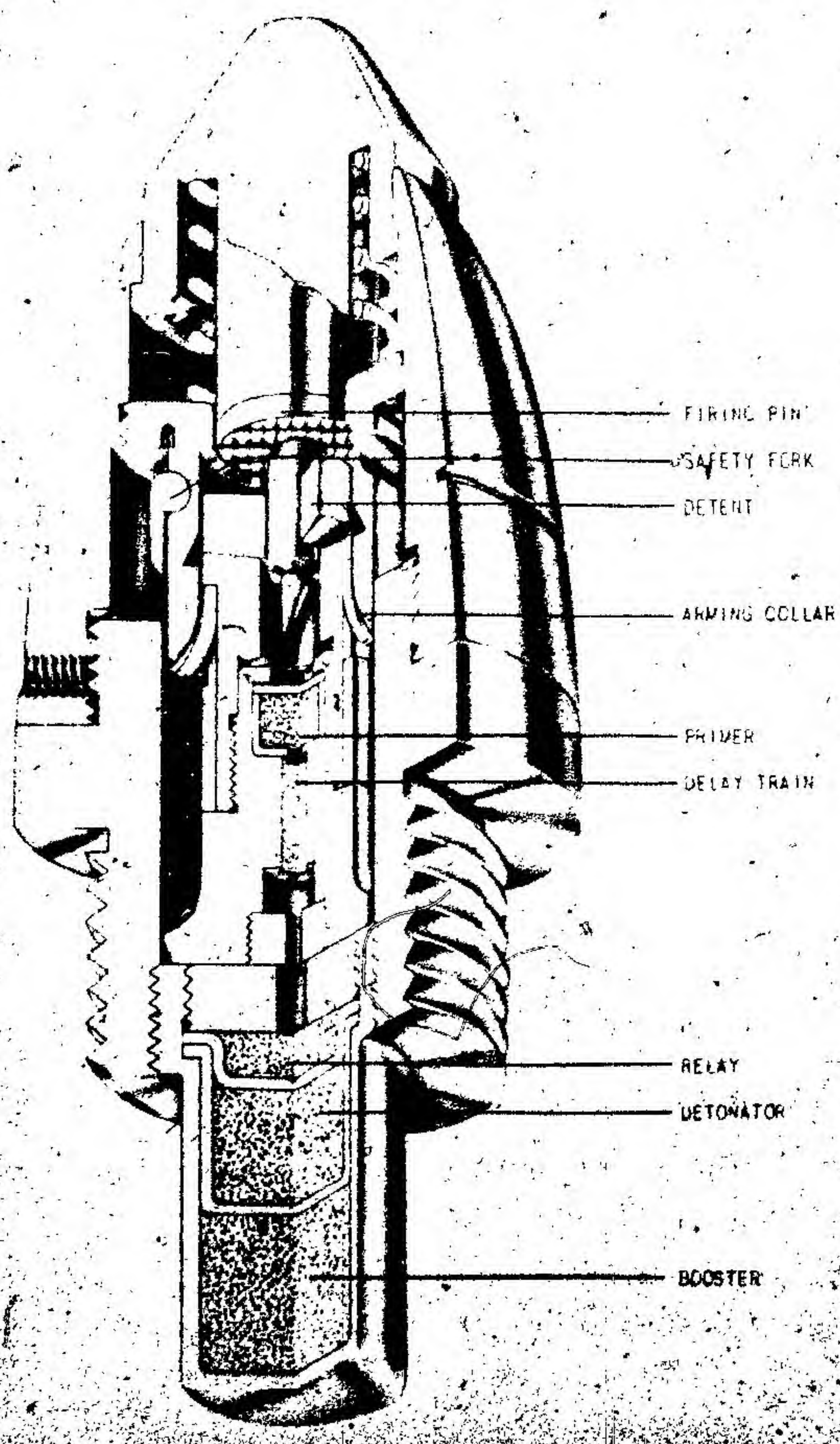


Figure 322—Type 88 Short-Delay (Gun and Howitzer-Mortar) Fuze.

guns, 70-mm tank guns, 75-mm guns, and 105-mm guns.

Howitzer-mortar type: H. E. projectiles for 70-mm, 120-mm, and 150-mm howitzers.

Description:

Over-all length (with gaine): $3\frac{1}{4}$ inches.

Over-all length (without gaine): $2\frac{1}{4}$ inches.

Maximum diameter: $1\frac{1}{4}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: 6, right-hand.

Construction: The brass fuze body is made of two major parts, threaded (L. H.) together, with an aluminum striker head. The external striker is supported by a spring and four steel wedges. A setback collar which surrounds the wedges is held in position by the latch springs. The latch

springs are fastened around the circumference of a movable primer-delay carrier.

The howitzer-mortar type fuze differs from the gun type fuze in that only the striker can move, the primer carrier being threaded to the body. The howitzer-mortar fuze also has weaker latch springs, allowing the fuze to function on a smaller amount of set-back.

Operation: Set-back causes the set-back collar to move down until it is engaged by the latch springs. The wedges are held in place by the striker until deceleration sets in. At this point they move out, impelled by centrifugal force, arming the fuze. On impact (in the gun fuze only) both the striker and the primer-delay carrier are free to move. This is to minimize the possibility of an unexploded projectile due to a very low angle of impact.

Type 88 Instantaneous (Gun and Howitzer Mortar) Fuze

Use:

Gun type fuze: H. E. projectiles for the 47-mm antitank gun, 57-mm tank gun, 75-mm guns, and 105-mm guns. This fuze is also used in incendiary and smoke projectiles for 75-mm guns.

Howitzer-mortar type fuze: Used in H. E. projectiles for 70-mm howitzer, 105-mm guns and howitzers, 120-mm howitzer, and 150-mm howitzers. It is also used in a smoke projectile for the 150-mm howitzer.

Description:

Over-all length (with gaine): $3\frac{1}{4}$ inches.

Over-all length (without gaine): $2\frac{1}{4}$ inches.

Maximum diameter: 1 inch.

Threaded length: 0.5 inch.

Number of threads: 5, right-hand.

Construction: The fuze body, of either black steel or brass, is made into two parts fitted together with threads (L. H.). The head of the aluminum striker protrudes from the fuze and is held in the unarmed position by four wedges which rest on a raised collar of the lower fuze body and are held in place by an arming collar. The arming collar is supported by latch springs. The striker in the armed position is held from the primer by a coiled spring.

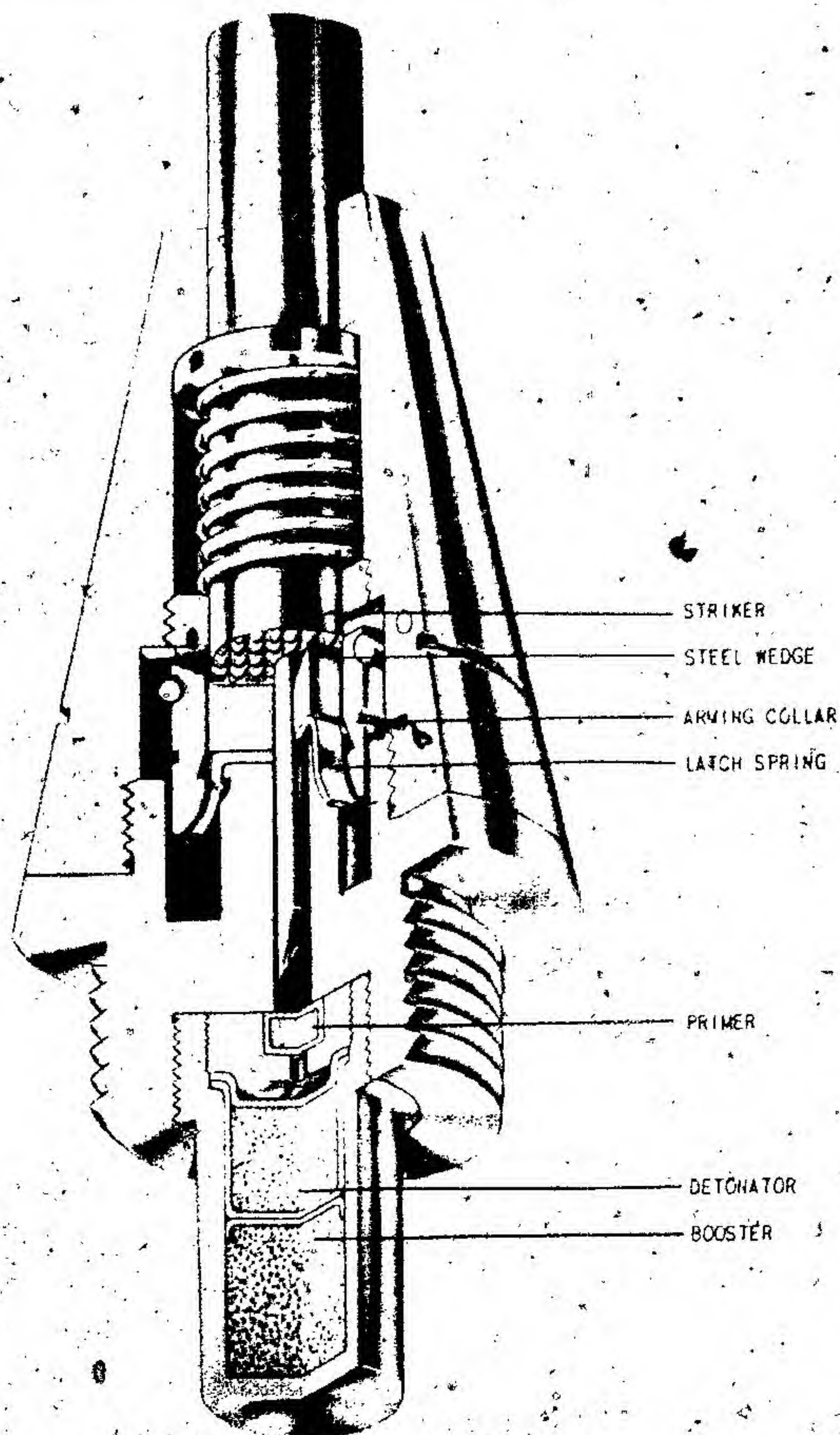


Figure 323—Type 88 Instantaneous (Gun and Howitzer-Mortar) Fuze.

Operation: Set-back causes the set-back or arming collar to move down until the notch on the inner side of the collar is engaged and held down by the latch springs. Centrifugal force moves the wedges out, arming the fuze. On impact the striker is forced down, overcoming the spring tension, to strike the primer.

Remarks: The howitzer-mortar and the gun type fuze are identical in construction except that the howitzer-mortar fuze has a weaker latch spring, which allows for arming with a smaller amount of set-back force.

Type 90 Instantaneous—Short-Delay Fuze

Use: Long pointed 15-cm projectile.

Description:

Over-all length (with gaine): $4\frac{1}{8}$ inches.

Over-all length (without gaine): $3\frac{7}{8}$ inches.

Maximum diameter: $1\frac{1}{8}$ inches.

Threaded length: $\frac{5}{8}$ inch.

Number of threads: 4, right-hand.

Construction: The fuze resembles in appearance a large-sized type 88 short-delay fuze. It has an aluminum striker head, a brass three-piece body, and a brass gaine. It has the following safety features: a heavy creep spring, hourglass shaped centrifugal detents under the striker, a centrifugal

shutter, which is held in place until after set-back by an arming collar-latch spring arrangement, and a safety fork, which also prevents the arming collar from moving down until the fork has been removed.

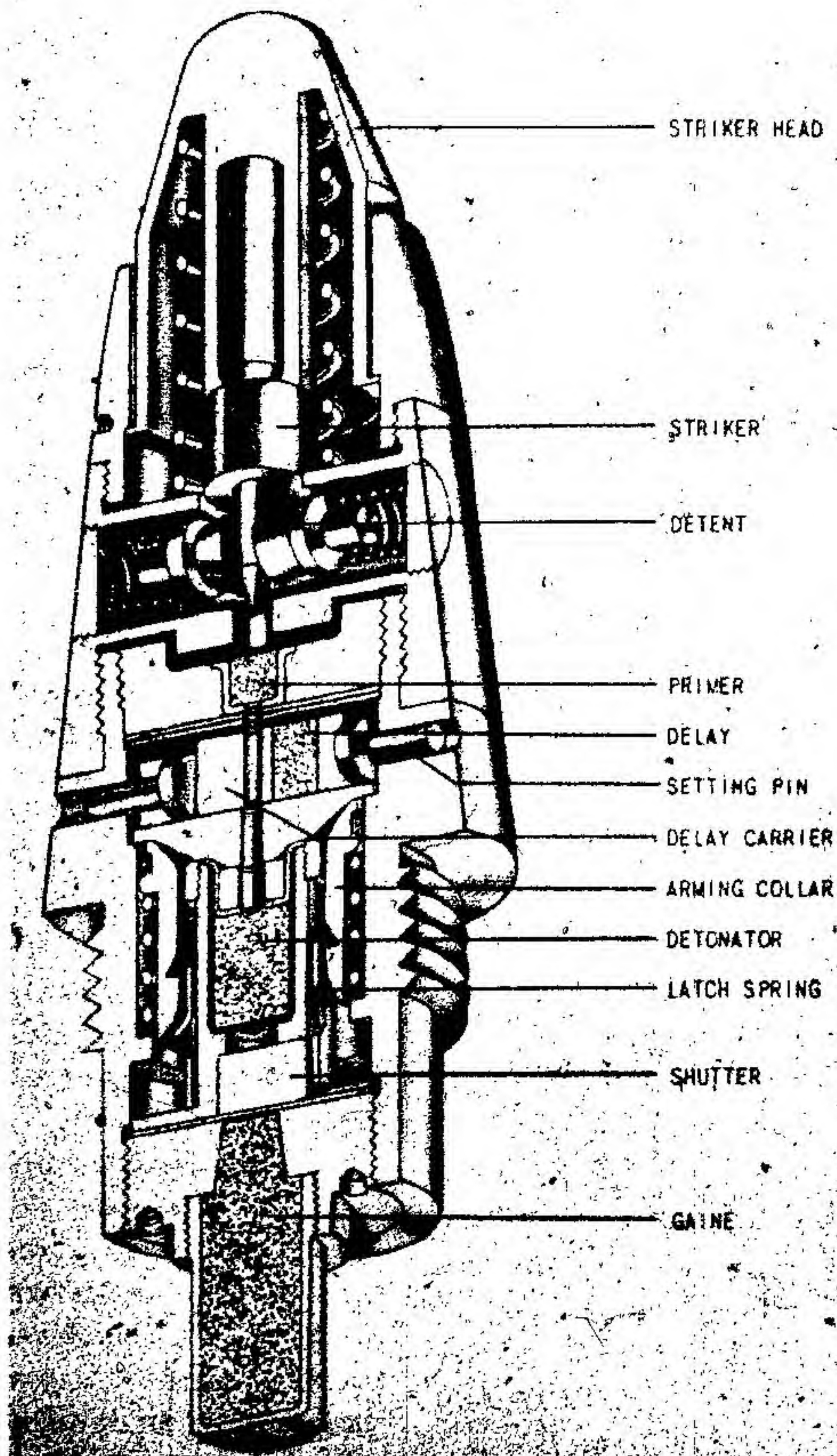


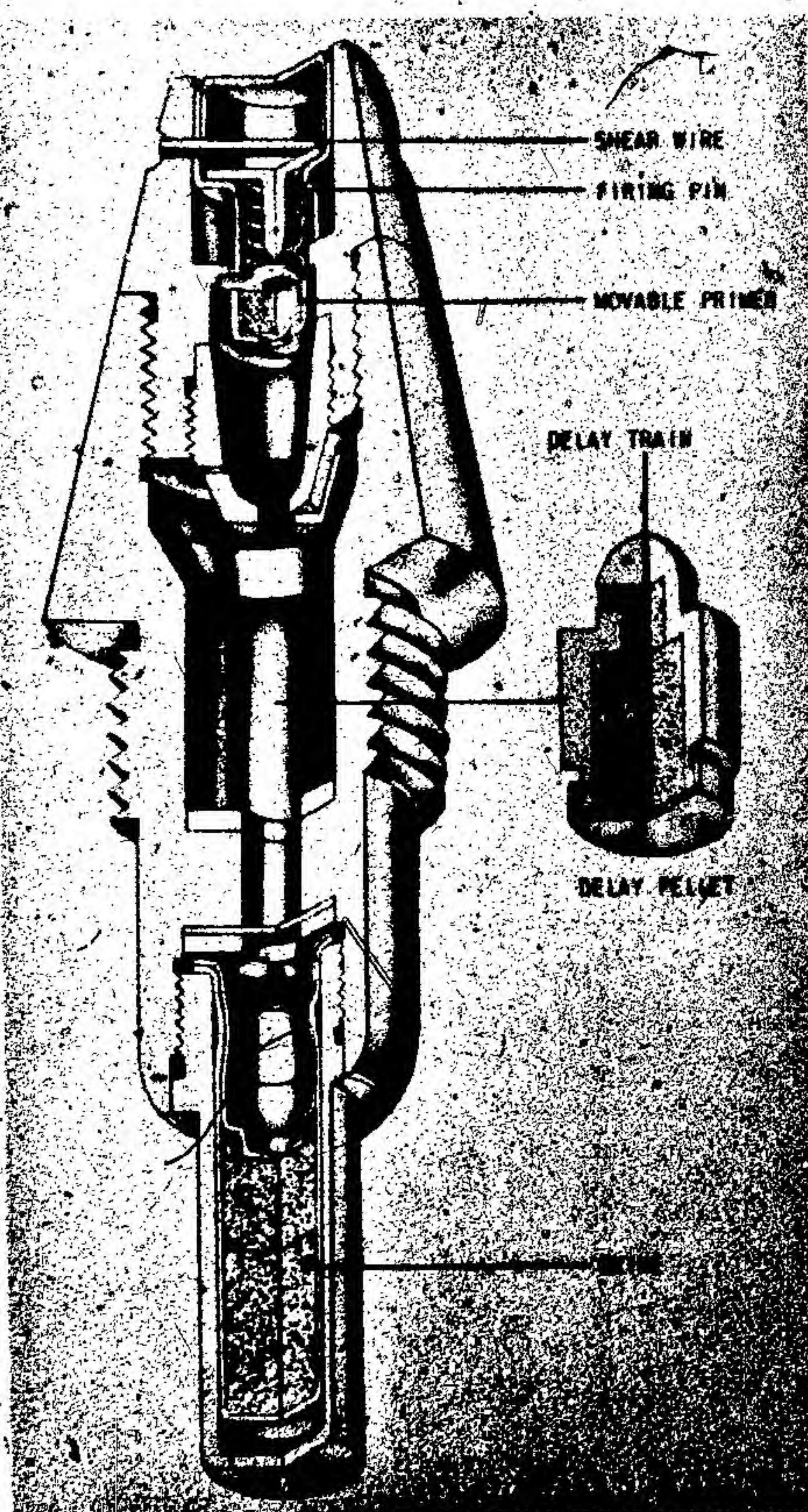
Figure 324—Type 90 Instantaneous-Short-Delay Fuze.

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Settings of instantaneous or short delay are accomplished by means of a sliding delay carrier, which has both an open channel and a powder delay channel. This delay carrier can be moved horizontally in its housing, so that either the instantaneous or short-delay channel is aligned with the firing train, by pushing on the proper setting pin with any sharp instrument. The delay carrier is held in place by friction and by centrifugal force after the projectile has been fired.

Operation: Set-back forces the striker down on the hourglass detents, holding them in place, and also forces the arming collar down, compressing

its spring, so that the latch springs are engaged. As set-back decreases, the striker is forced up by its spring, releasing the detents, which move out against their springs because of centrifugal force. The arming collar spring also forces the arming collar up, carrying the latch springs with it. This allows centrifugal force to move the shutter out, thus clearing the flash channel. On impact, the striker is driven into the primer, which flashes either into the delay element or into the instantaneous channel, depending on the setting, and from there to the detonator. The detonator initiates the gaine.



Type 93 Instantaneous—Short-Delay Fuze

Use: H. E. projectiles for the 81-mm, 90-mm, and 150-mm mortars and incendiary projectiles for the 93-mm mortar.

Description:

Over-all length (with gaine): $3\frac{1}{2}$ inches.

Over-all length (without gaine): $2\frac{1}{2}$ inches.

Maximum diameter: $1\frac{1}{4}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: 5, left-hand.

Construction: The brass fuze body is made in two major parts joined together by (right-hand) threads. A housing, containing the firing pin and a movable primer, is press-fitted into a recess in the upper fuze body and supported by a shear pin. The firing pin and movable primer are separated by a coiled spring. The primer is held from the firing pin by a metal washer with two ears, 180° apart. These ears fit into longitudinal slots in the lower part of the firing pin housing and rest against the under side of a shoulder in the upper fuze body. The gaine threads (left-hand) into the lower fuze body.

Operation: On impact the shear wire is broken and the lower part of the firing pin housing is driven down into a recess in the upper fuze body, thus freeing the primer to move forward onto the firing pin. The choice of instantaneous or short delay is made by unscrewing the upper body and inserting or removing a delay pellet.

Figure 325—Type 93 Instantaneous-Short-Delay Fuze.

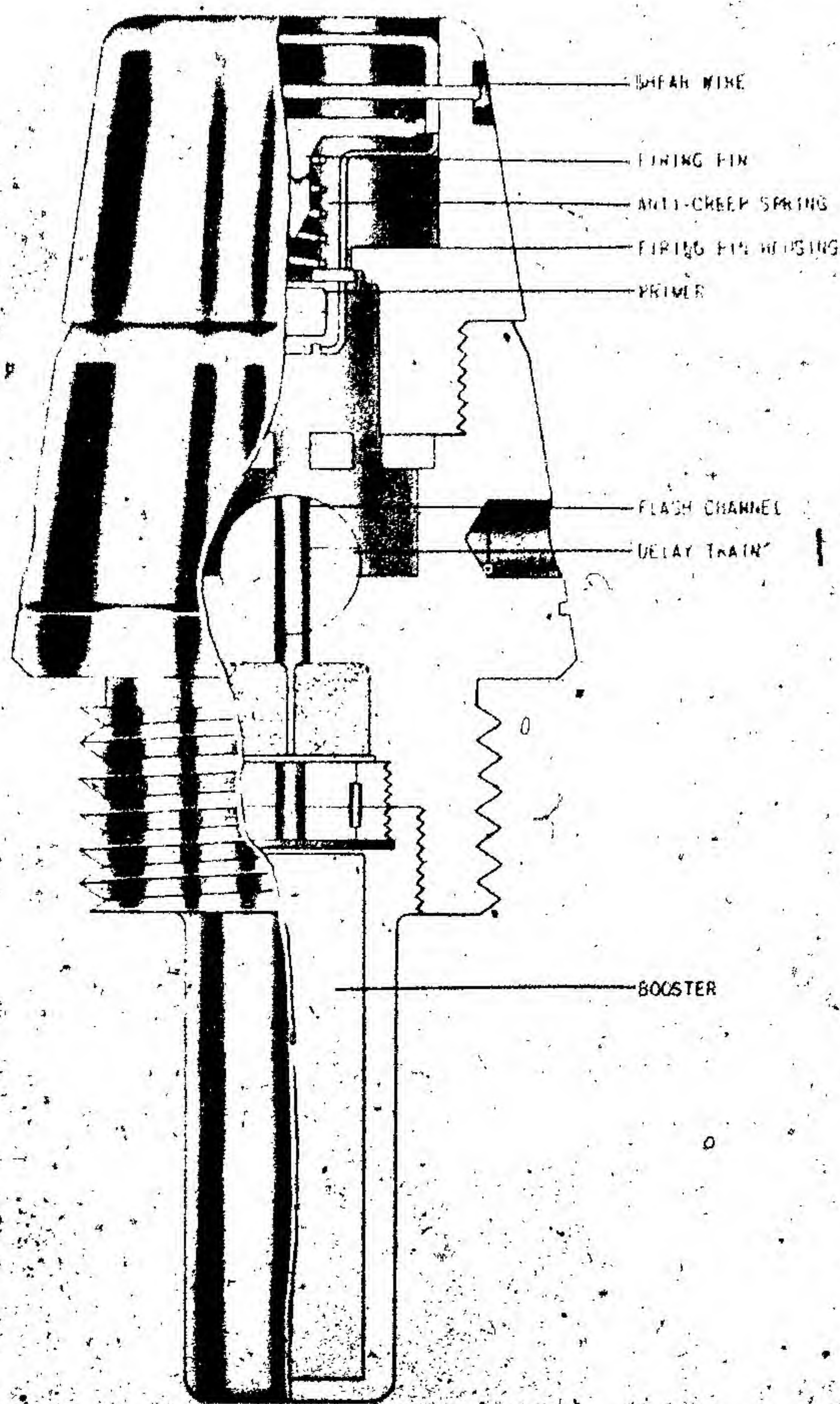


Figure 326—Type 100 Instantaneous-Short-Delay Fuze.

Type 100 Instantaneous—Short-Delay Fuzes

Use: H. E. projectiles for 81-mm, 90-mm, and 150-mm mortars.

Description:

Over-all length (with gaine): $3\frac{1}{4}$ inches.
 Over-all length (without gaine): $2\frac{1}{2}$ inches.
 Maximum diameter: $1\frac{1}{4}$ inches.
 Threaded length: $\frac{1}{2}$ inch.
 Number of threads: 6, left-hand.

Construction: The fuze body is of two-piece brass construction, with the upper part threading (right-hand) into the lower. A housing, containing the firing pin and a movable primer, is press-fitted into a recess in the upper fuze body and supported by a shear pin. The firing pin and movable primer are separated by a coiled spring. The primer is held from the firing pin by a metal washer containing two ears 180° removed. These ears fit into longitudinal slots in the lower part of

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the firing pin housing and rest against the underside of a shoulder in the upper fuze body. A selector for short delay or instantaneous action is located and extends across the lower fuze body. This selector consists of a solid brass cylinder, one end of which is slotted for external control. Passing through the cylinder is a hollow flash channel for instantaneous action. Ninety degrees removed and in the same vertical plane is a delay

channel which intercepts the instantaneous channel. The gaine threads (left-hand) into the lower fuze body.

Operation: On impact the shear wire is broken and the lower part of the firing-pin housing is driven down into a recess in the upper fuze body, thus freeing the primer to move forward onto the firing pin. The primer flashes through the selector switch to the explosive train.

Finned Bangalore Torpedo Fuze

Use: 50-mm finned bangalore torpedo.

Description:

Over-all length (with gaine): $3\frac{1}{8}$ inches.

Maximum diameter: $1\frac{1}{8}$ inches.

Threaded length: $\frac{1}{4}$ inch.

Number of threads: 6.

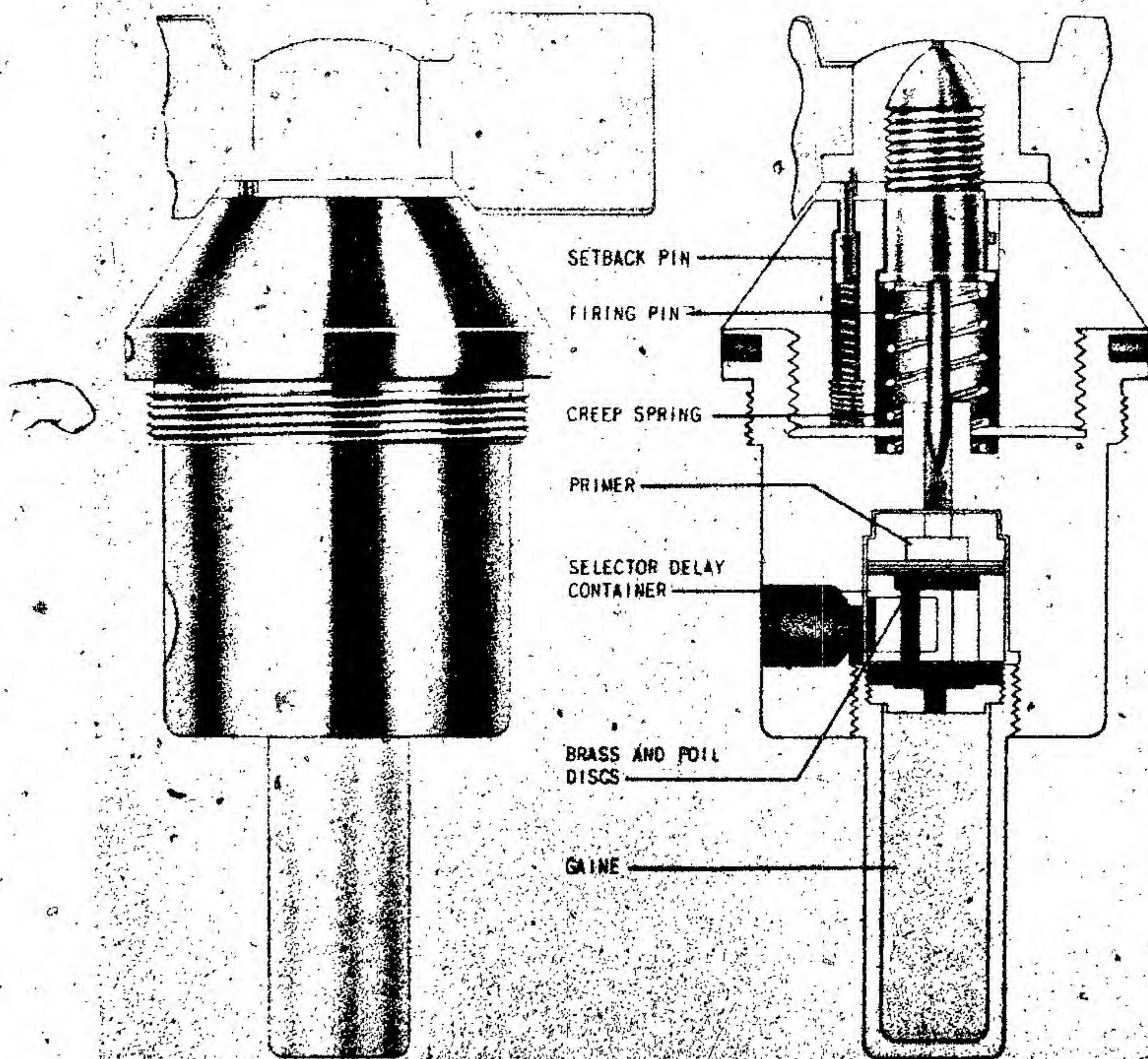


Figure 327—Finned Bangalore Torpedo Fuze.

Construction: The fuze consists of a brass vane cap and vanes, black steel two-piece body, brass keyed striker, steel creep spring, brass selector delay, container, and a brass gaine. Either an instantaneous or a short delay setting may be made by inserting a screw driver into the slotted end of the cylinder and rotating the cylinder in the selector delay container so the instantaneous flash channel is either open for instantaneous burst, or closed for a short delay burst. The delay powder train is ignited in either case. A

set-back pin prevents the vanes from rotating until the projectile is fired.

Operation: The arming fork is removed when the finned bangalore is ready to be fired. When it is fired, the set-back forces the set-back pin down, allowing the vanes to rotate up and off, leaving the striker exposed and supported only by its creep spring. On impact, the striker compresses the creep spring and is driven into the primer. The flash from the primer ignites the delay train and, if the instantaneous channel is open, also flashes directly into the gaine.

Type 98 Interior Fuze

Use: 32-cm spigot mortar.

Description:

Over-all length (with gaine): $3\frac{1}{8}$ inches.

Maximum diameter: $1\frac{1}{4}$ inches.

Threaded length: $\frac{3}{4}$ inch.

Number of threads: 8.

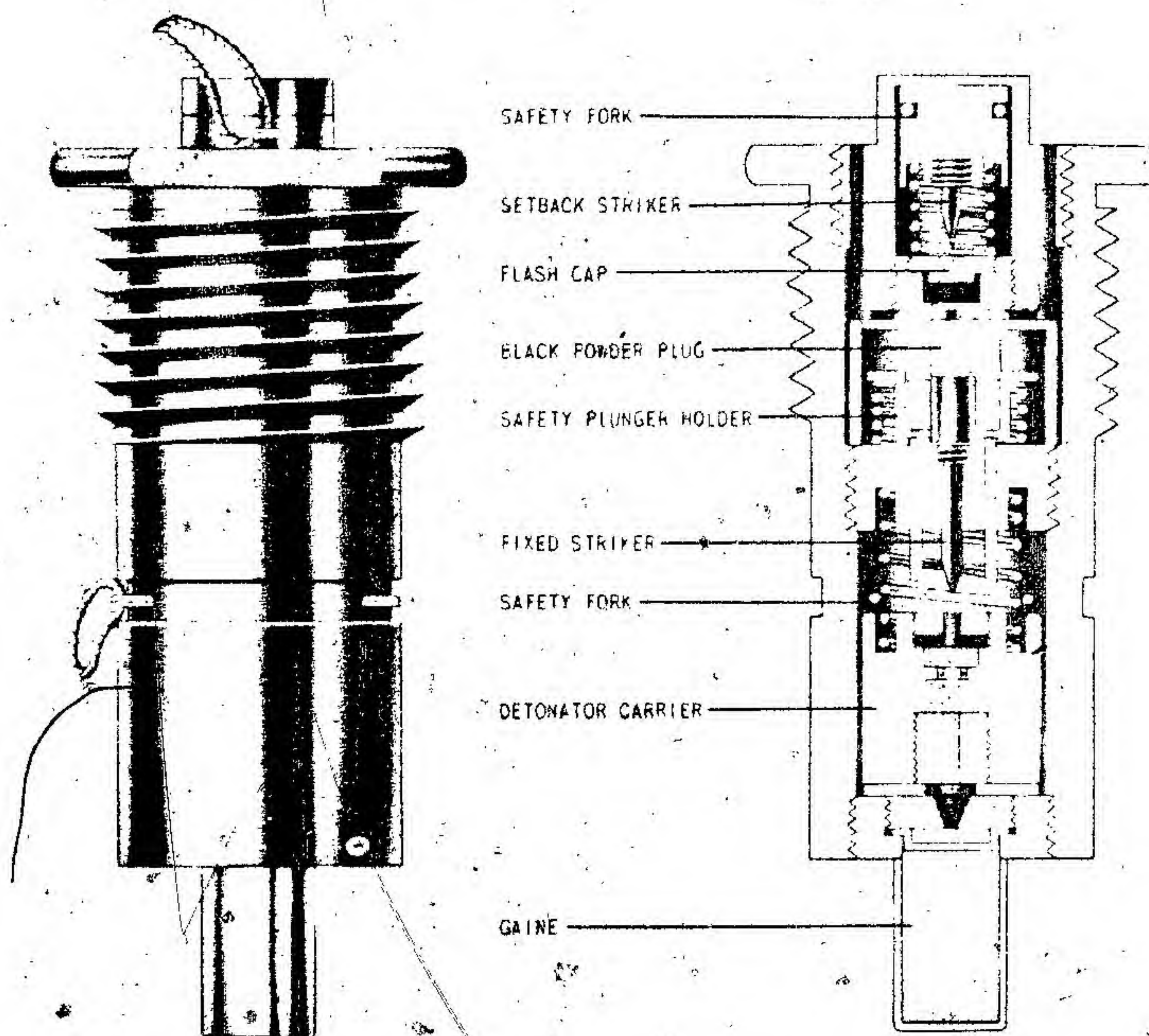


Figure 328—Type 98 Interior Fuze.

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Construction: The fuze consists of two sections housed in a one-piece body. The two sections are separated by a fuze striker housing. The upper section consists of a flash cap and a set-back striker and striker block separated by a safety spring and upper safety fork. Below the flash cap is a hard block of black powder. The safety plunger is spring-loaded upward against the block by the safety plunger spring, which also bears against the fixed striker housing. Two safety plungers which are fixed to the safety plunger holder protrude through holes in the fixed firing pin. The fixed firing pin and inertia primer hous-

ing are separated by an anti-creep spring and lower safety fork.

Operation: The upper safety fork is removed from the fuze in the nose section, the other forks having been removed during assembly of the round. Upon setback the setback striker hits the flash cap. The flash from the cap burns the black-powder plug and allows the safety plunger holder to move forward. This raises the two safety plungers, exposing the fixed striker to the detonator carrier. On impact the detonator carrier moves forward against the anticreep spring and hits the fixed firing pin.

Type 89 Small Time Fuze

Use: Smoke projectiles for the 50 mm grenade discharger and illuminating projectiles for the 70-mm Mortar and the 70-mm howitzer.

Description:

Over-all length: $1\frac{1}{4}$ inches.

Maximum Diameter: $1\frac{1}{8}$ inches.

Threaded Length: $\frac{1}{4}$ inch.

Number of Threads: 4, left-hand.

Construction: The fuze is made of brass, consisting of the main body and a nose cap fitted together by L. H. threads. There are two brass time rings, one being fixed and the other movable. The primer is located in the lower part of the fuze and is separated from the striker by a spring.

The striker is also supported by a safety wire which passes through the nose of the fuze.

Operation: The safety wire holding the striker is removed before the projectile is fired. On setback the striker moves down against the spring to hit the primer. The flash from this ignites the powder train, which burns through the two time rings into the magazine at the base of the fuze.

Remarks: This fuze has a time setting of 0. to 20 seconds in increments of $\frac{1}{2}$ second.

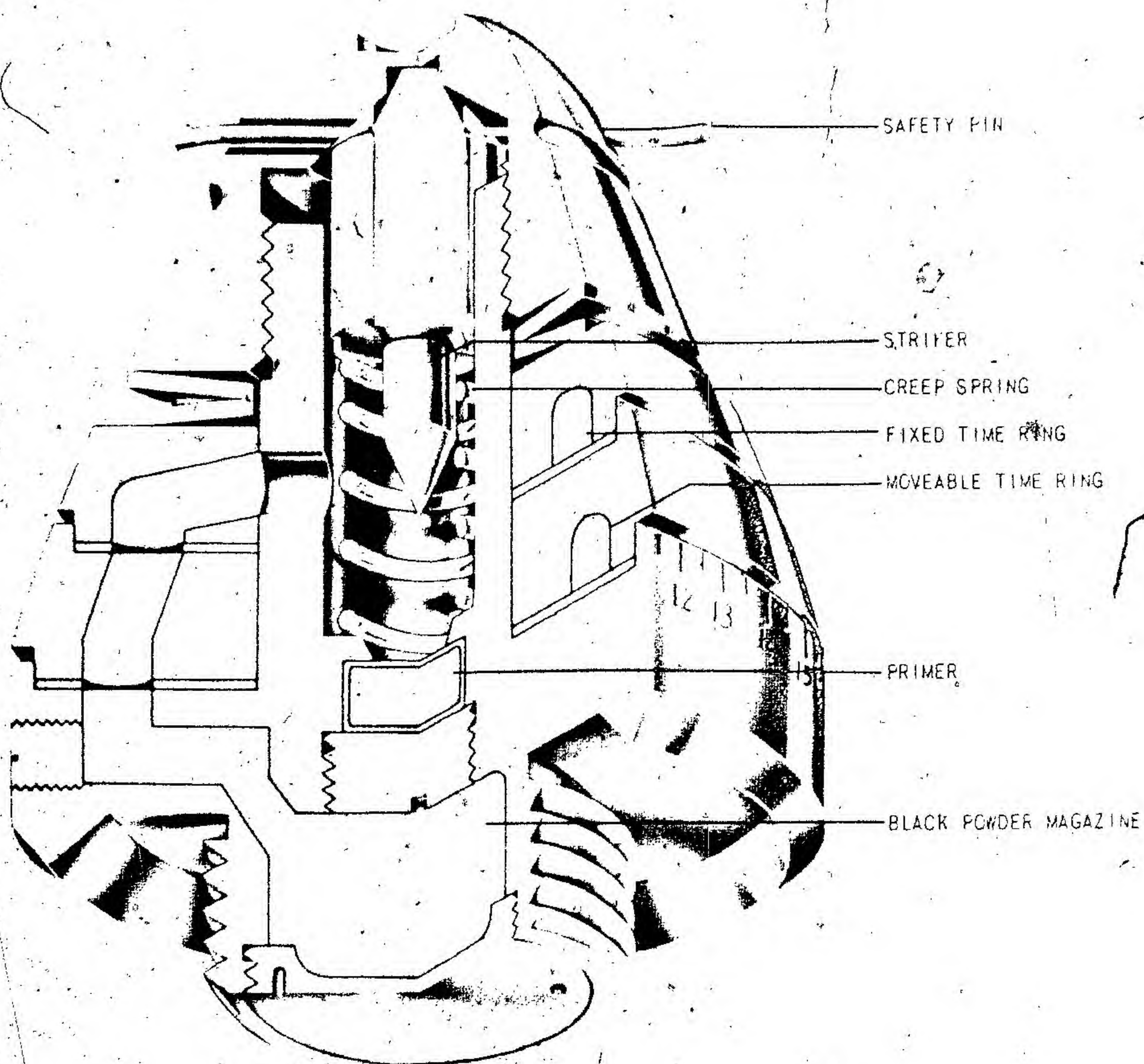


Figure 329—Type 89 Small Time Fuze.

Type 89 Powder Time Fuze

Use: H. E. projectiles for the 75-mm and 105-mm antiaircraft guns.

Description:

Over-all length: 3 $\frac{1}{4}$ inches.

Maximum diameter: 2 $\frac{1}{8}$ inches.

Threaded length: $\frac{3}{8}$ inch.

Number of threads: 4, right-hand.

Construction: This fuze is made of brass and consists of a nose cap, a central spindle, and four powder time rings. Of the four powder rings

surrounding the spindle, the first and third are fixed. The second and fourth rings are movable and keyed so that they move as one unit. Hour

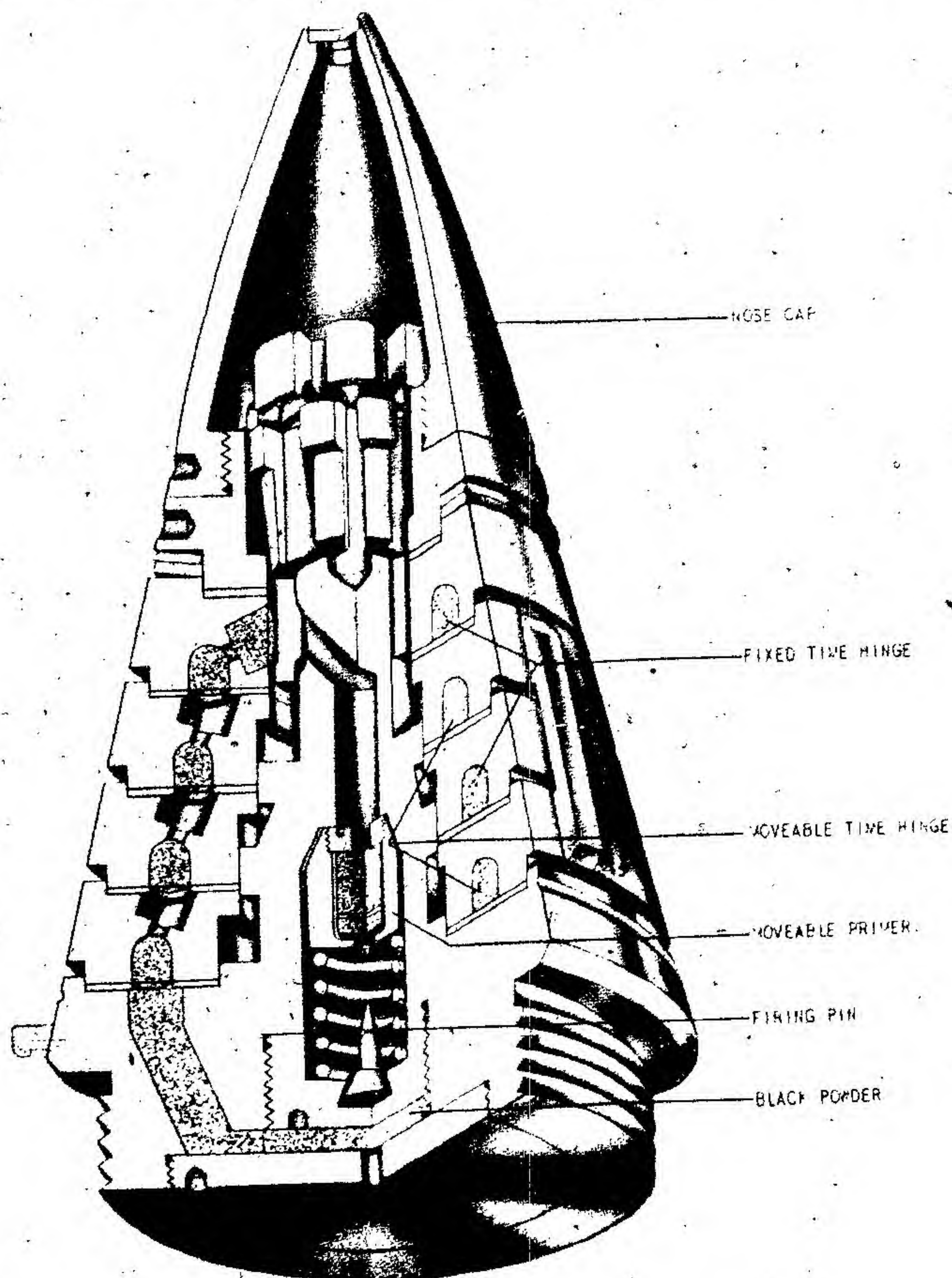


Figure 330—Type 89 Powder Time Fuze.

in the base of the central spindle is a firing pin which is separated from the movable primer by a small coiled spring. The base plate contains a flash charge of black powder.

Operation: This fuze may be set for any time between 0 and 30 seconds in increments of $\frac{1}{2}$ second. On set-back the primer moves down onto the fixed firing pin, sending a flash up through

the central spindle to the upper time ring. As the last powder time ring burns, the flash is transmitted to a black-powder magazine and thence to an auxiliary detonating fuze which is used in conjunction with this fuze and is threaded into the fuze pocket separately.

Remarks: This fuze is also used in Navy 8-inch antiaircraft projectiles.

Auxiliary Detonating Fuze

Use: In conjunction with the type 89 (powder time), type 2 powder time and impact fuze and type 100 mechanical time and impact fuze.

Description:

- Over-all length: $1\frac{1}{8}$ inches.
- Length (without gaine): $1\frac{1}{4}$ inches.
- Maximum diameter: $1\frac{1}{2}$ inches.
- Threaded length: $\frac{5}{8}$ inch.
- Number of threads: 7, right-hand.

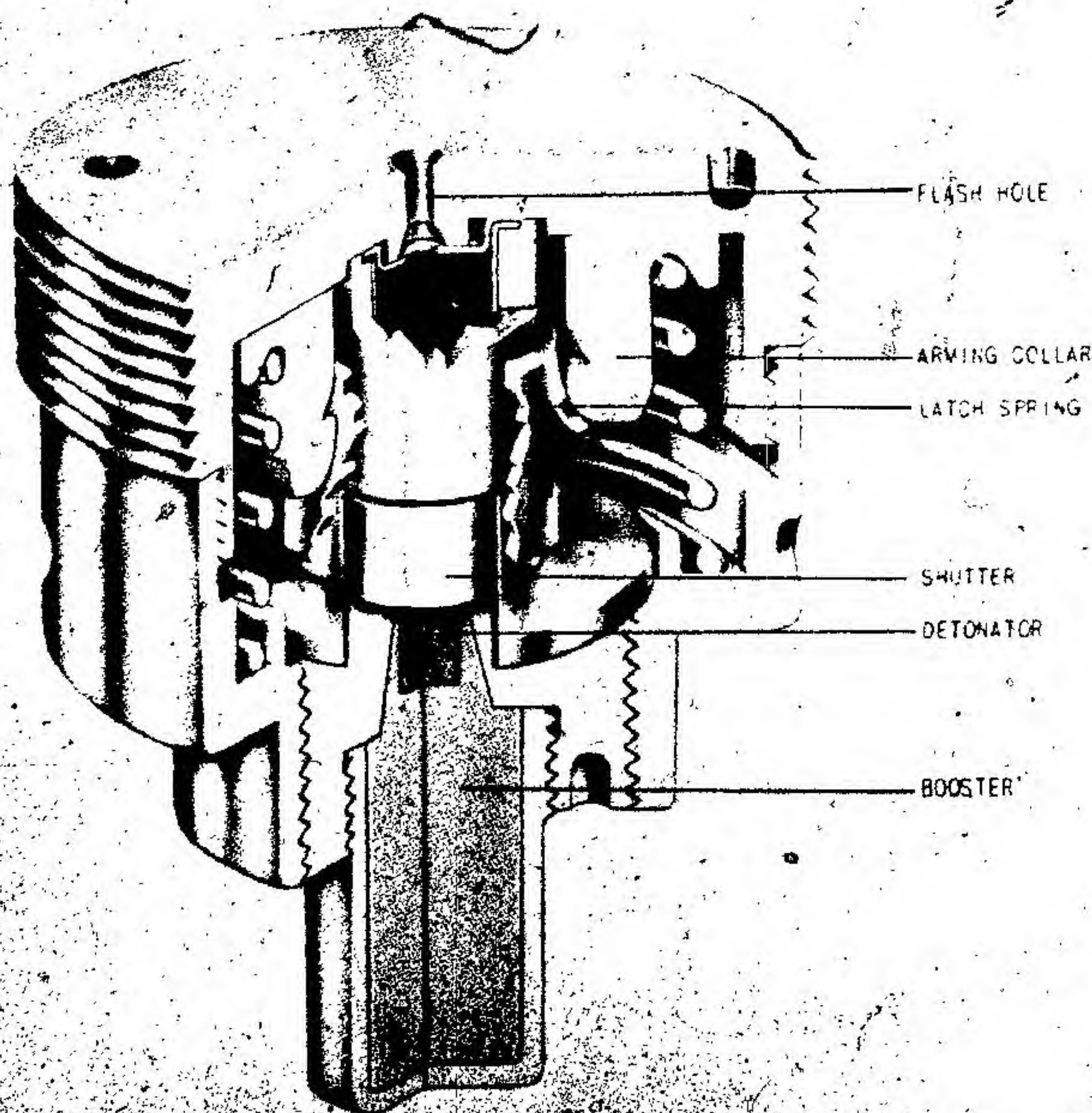


Figure 331—Auxiliary Detonating Fuze.

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Construction: This fuze is made of two brass sections. The top portion is threaded (R. H.) externally to fit into the fuze pocket and internally to receive the base portion. Centrally located in the top plate is a flash hole leading to a relay charge and the gaine. The mechanism housed within the fuze consists of an arming collar supported by a coiled spring and the ears of a circumferential latch spring. In the unarmed position, a metal

shutter, held in place by the lower portion of the latch spring, closes a flash channel from the relay charge to the gaine. The gaine threads into the lower portion.

Operation: On set-back the arming collar moves down, engaging the ears of the latch spring. During deceleration, the coiled spring raises the arming collar and latch spring, freeing the shutter, which moves out with centrifugal force and leaves the flash channel open.

Type 3rd-Yr. Combination Powder Time and Impact Fuze

Use: 75-mm shrapnel and old H. E. projectiles.

Description:

Over-all length: $2\frac{1}{4}$ inches.

Maximum diameter: $2\frac{1}{4}$ inches.

Threaded length: $\frac{1}{4}$ inch.

Number of threads: 4, right-hand.

Construction: This fuze is made of brass. A central spindle and base section are made in one piece. Two powder time rings (the upper fixed, the lower movable) are fitted around the spindle

and held in place by a nose cap, which threads onto the top of the spindle. The time-ring primer is housed in the nose cap and before firing is supported by a safety pin which passes through

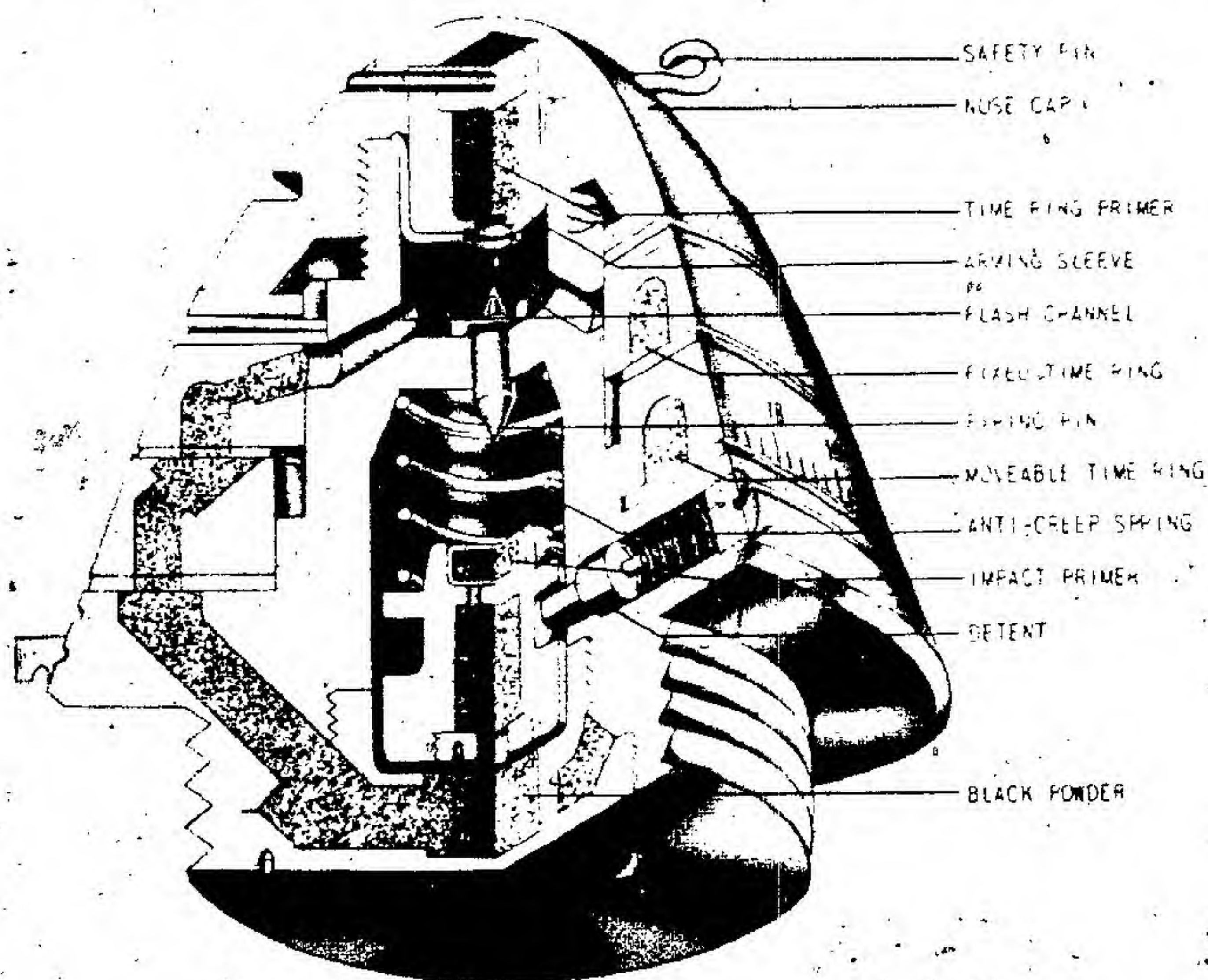


Figure 332—Type 3d-year Combination Powder Time and Impact Fuze.

it and the nose cap. The primer is also supported by an arming sleeve. A partition in the hollow spindle has a firing pin on both sides. A second movable primer (impact primer) is housed in the base of the spindle. It is held in place by two centrifugal detents and separated from the firing pin by a coiled spring. A base plate threads into the base section and contains a black-powder magazine. The movable time ring graduated from 0 to 22 seconds in increments of $\frac{1}{2}$ second.

Operation: Before firing, the safety pin is removed and the time ring set. On setback the

time ring primer moves down onto the firing pin. The flash from the primer passes through a flash channel to the upper time ring. The powder train leads through the time rings down to the black powder magazine.

Centrifugal force causes the detents to move out, freeing the impact primer, and, if the projectile hits before the time setting has elapsed, the primer carrier moves against the spring onto the firing pin. The flash from the primer sets off the black-powder magazine.

Type 5th-Year Combination Powder Time and Impact Fuze

Use 75-mm shrapnel, incendiary, and illuminating projectiles, 105-mm shrapnel and incendiary projectiles, and 150-mm shrapnel and illuminating projectiles.

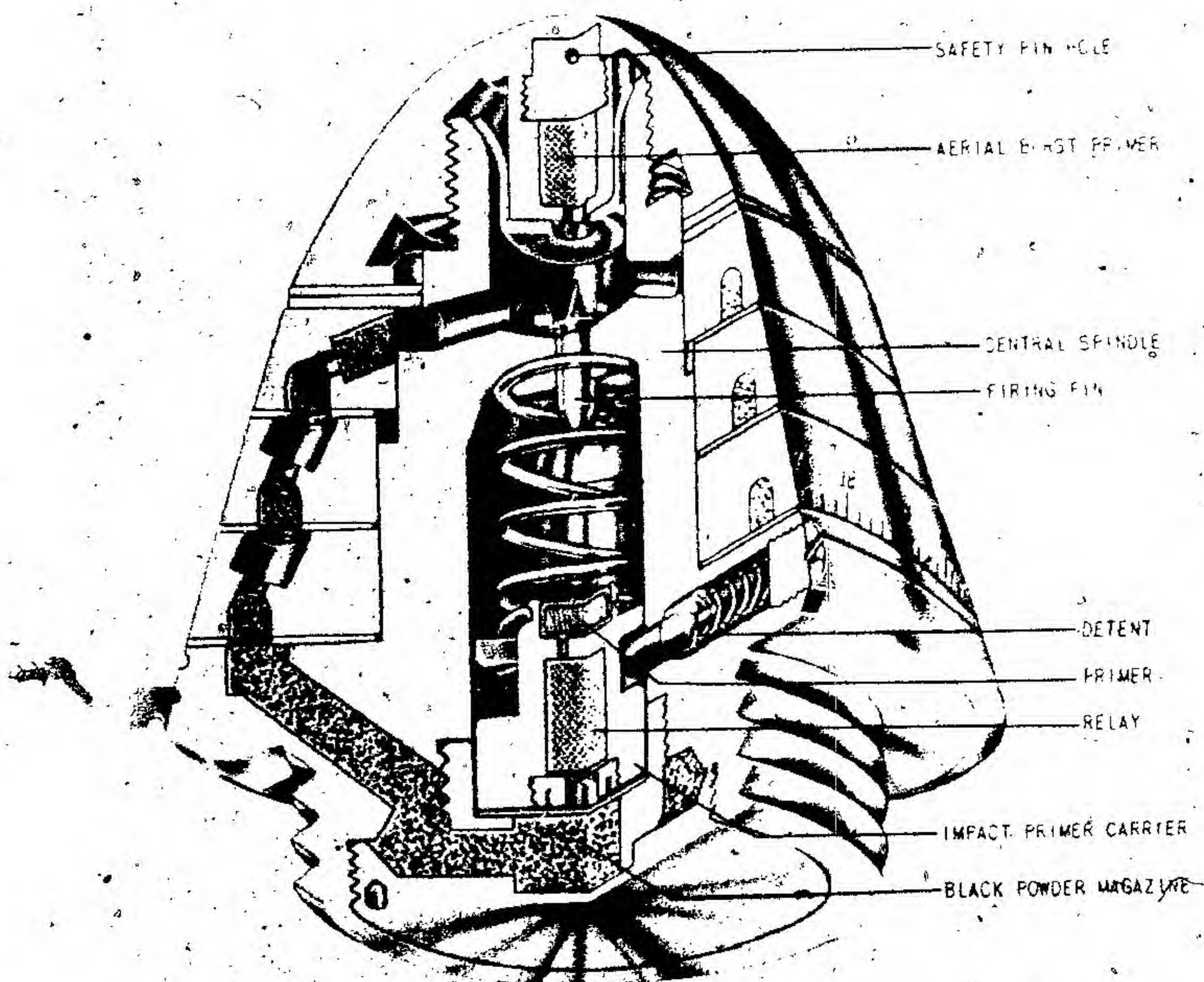


Figure 333—Type 5th-year Combination Powder Time and Impact Fuze.

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Description:

Over-all length: $2\frac{1}{4}$ inches.

Maximum diameter: $2\frac{1}{2}$ inches.

Thread length: $\frac{1}{2}$ inch.

Number of threads: 3, right-hand.

Construction: This fuze is made of brass. A central spindle and base section are of one piece. Three powder time rings are fitted over the spindle and held in place by a nose cap which threads onto the top of the spindle. Housed in the nose cap is an aerial-burst primer carrier seated in a metal cup. The base of this cup has one centrally located hole. The top of the sides are flanged and rest on a shoulder of the central spindle. A safety pin is fitted through the nose cap and the primer carrier. A partition in the hollow spindle contains a firing pin pointed on either end. Housed in the base of the spindle is a detent-held, movable impact primer carrier which is separated from the firing pin by a coiled

spring. A base plate threads into the base section and contains a black-powder magazine. The top and lower powder time rings are keyed together and movable; the center ring is stationary. The rings are graduated from 0 to 36.6 seconds in increments of $\frac{1}{4}$ second.

Operation: Before firing, the safety pin is removed and the time rings set. On setback, the aerial burst primer moves down onto the stationary firing pin, and the resulting flash ignites, through a flash channel, the upper time ring. The powder train leads through the time rings down to the black powder magazine in the base of the fuse.

Centrifugal force causes the detents to move out, freeing the impact primer, and, if the projectile hits before the time setting has elapsed, the primer carrier moves against the spring onto the firing pin. The flash from the primer sets off the black-powder magazine.

Type 100 Mechanical Time and Impact Fuze

Use: Antiaircraft ammunition for type 14-year 105-mm A. A. gun and type 99 88-mm A. A. gun.

Description:

Over-all length: $4\frac{1}{4}$ inches.

Maximum diameter: $2\frac{1}{2}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: No data.

Construction: This is a 50-second combination mechanical time and impact projectile fuze. The clockwork mechanism is essentially the same as that found in the Navy type 91 fuze. The aluminum alloy windshield adds form to the fuze and houses the upper end of the setback hammer. The time-setting ring, assembly ring, and lower fuze body are made of an aluminum alloy. The clockwork mechanism is housed in the time-setting ring and assembly ring. The time firing assembly consists of a primer cap under which is a black-powder flash channel leading to a small black-powder magazine in the base plug. The impact firing assembly consists of a stationary firing pin separated from a movable primer carrier by a

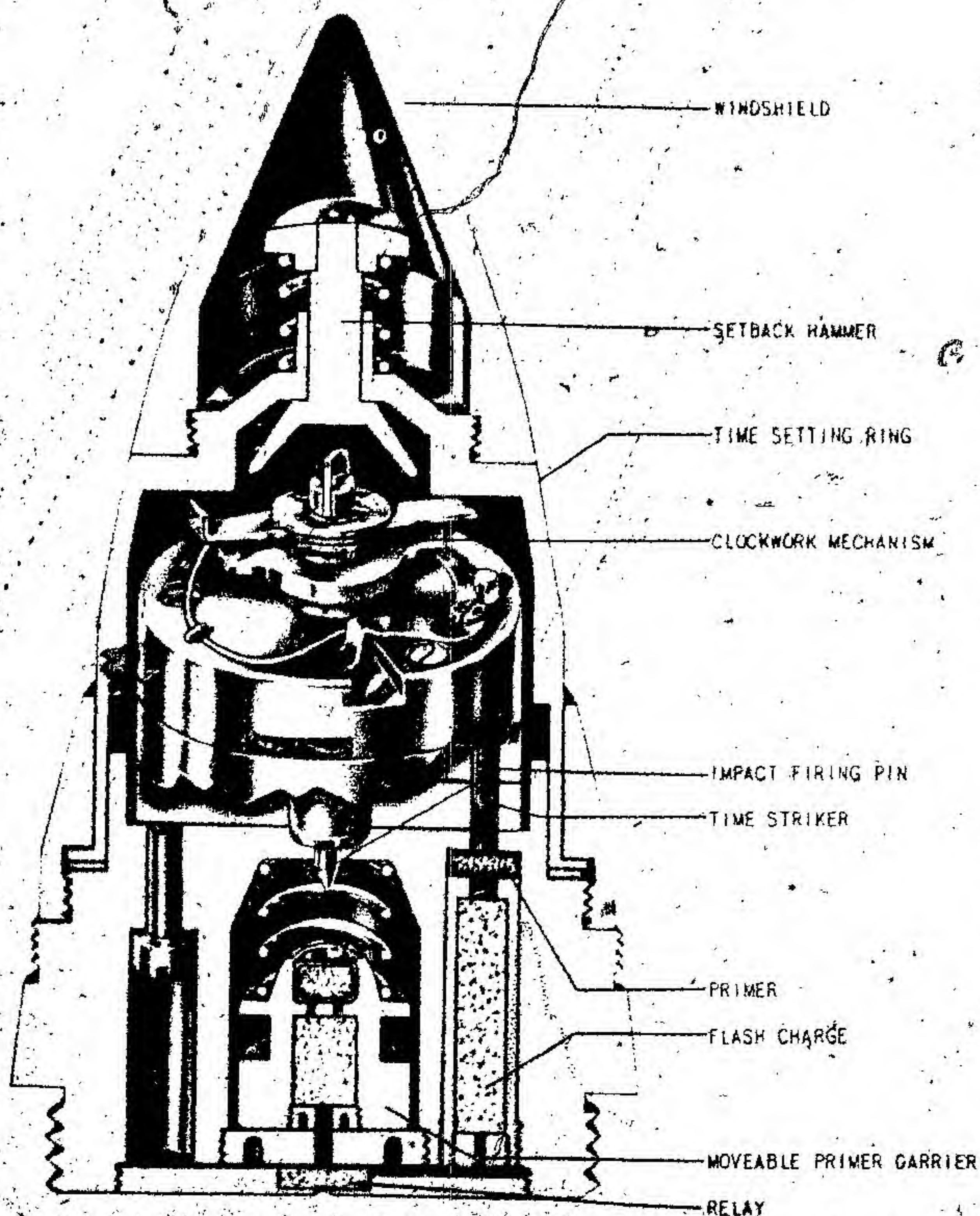


Figure 334—Type 100 Mechanical Time and Impact Fuze.

spring. Two spring-loaded detents are engaged in the slot of the primer carrier until the projectile is rotating in flight.

Operation:

Time: See Navy type 91.

Impact: Centrifugal force moves the detents from the slot in the primer carrier and the primer carrier is then free to overcome the spring and hit the fixed firing pin upon impact. A small black powder charge flashes to the base magazine which in turn fires the auxiliary detonating fuze. The Army auxiliary detonating fuze is used in conjunction with the type 100.

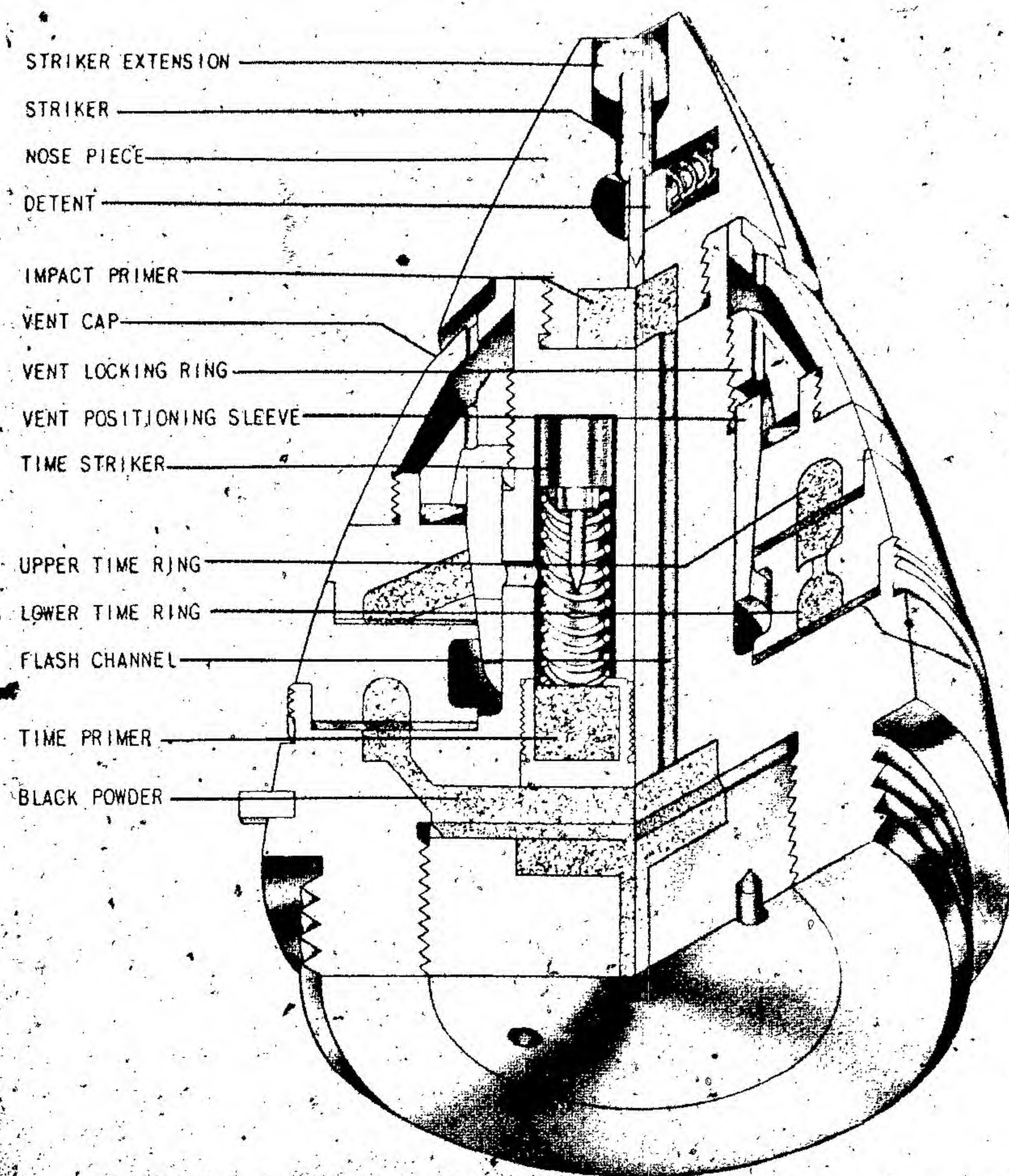


Figure 335—Type 2 Combination Powder Time and Impact Fuze.

Type 2 Combination Powder Time and Impact Fuze

Use: H. E. projectiles for the 75-mm and 105-mm antiaircraft guns.

Description:

Over-all length: $2\frac{1}{2}$ inches.

Maximum diameter: $3\frac{1}{4}$ inches.

Threaded length: $\frac{3}{4}$ inch.

Number of threads: 4, right-hand.

Construction: This fuze is constructed of brass and aluminum. The fuze body, time rings, vent positioning sleeve, and vent locking ring are made of brass; while the vent cap, nose piece, and base plug are of aluminum. The striker extension is wood.

The movable time train has setting markings from 1 to 44 seconds, in half-second intervals.

The vent positioning sleeve separates the time rings from the central fuze body, and vertical grooves in this sleeve allow the gases from the burning time rings to pass off. A key prevents the sleeve from turning, and the upper time ring is also held stationary by a key which threads into the central fuze body.

The vent locking ring threads on the central fuze body and secures the time rings and the sleeve. It is held off the upper ring by belleville springs. The ring is further secured by a grub screw.

The vent cap threads onto the upper time ring and contains holes for the escape of gases.

Contained in the nose cap is the complete impact firing mechanism, consisting of a wooden striker extension, striker, centrifugal detent, detent spring, and primer cap.

The fuze body has two longitudinal flash channels through its central part to allow the flash from the impact primer to ignite the black-powder magazine in the base. The time firing-pin safety spring, and time primer cap are also housed in the central fuze body. A transverse hole in the body between the time firing mechanism and the upper time ring allows the flash of the primer cap to ignite the upper time ring.

The fuze is stored with a protective cap screwed on the fuze body just below the lower time ring.

Operation:

Time: Set-back initiates the time striker. Because of four longitudinal grooves in the striker, the flash escapes to and through the transverse opening to the upper powder ring. From the lower powder ring a black powder flash channel ignites the black-powder magazine in the base.

Impact: The detent moves from under the striker with centrifugal force. On impact the nose is crushed, driving the striker onto the primer cap. The flash passes through the flash channel in the central fuze body to the black-powder magazine in the base.

Type 94 Small-Delay Base Fuze

Use: A.P.-H.E. projectiles for 37-mm tank and antitank guns.

Description:

Over-all length: No data.

Maximum diameter: $1\frac{1}{2}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: 8, right-hand.

Construction: The fuze is made of one piece of black steel which houses the base plate, striker, arming sleeve, creep spring and firing train. The after end of the striker fits into a recess in the base plate and has an enlarged shoulder to engage the arming sleeve. A creep spring is housed in the arming sleeve resting between the primer housing and an inner shoulder of the arming sleeve. The striker is held from the primer by a shear wire which passes through the arming sleeve and the striker.

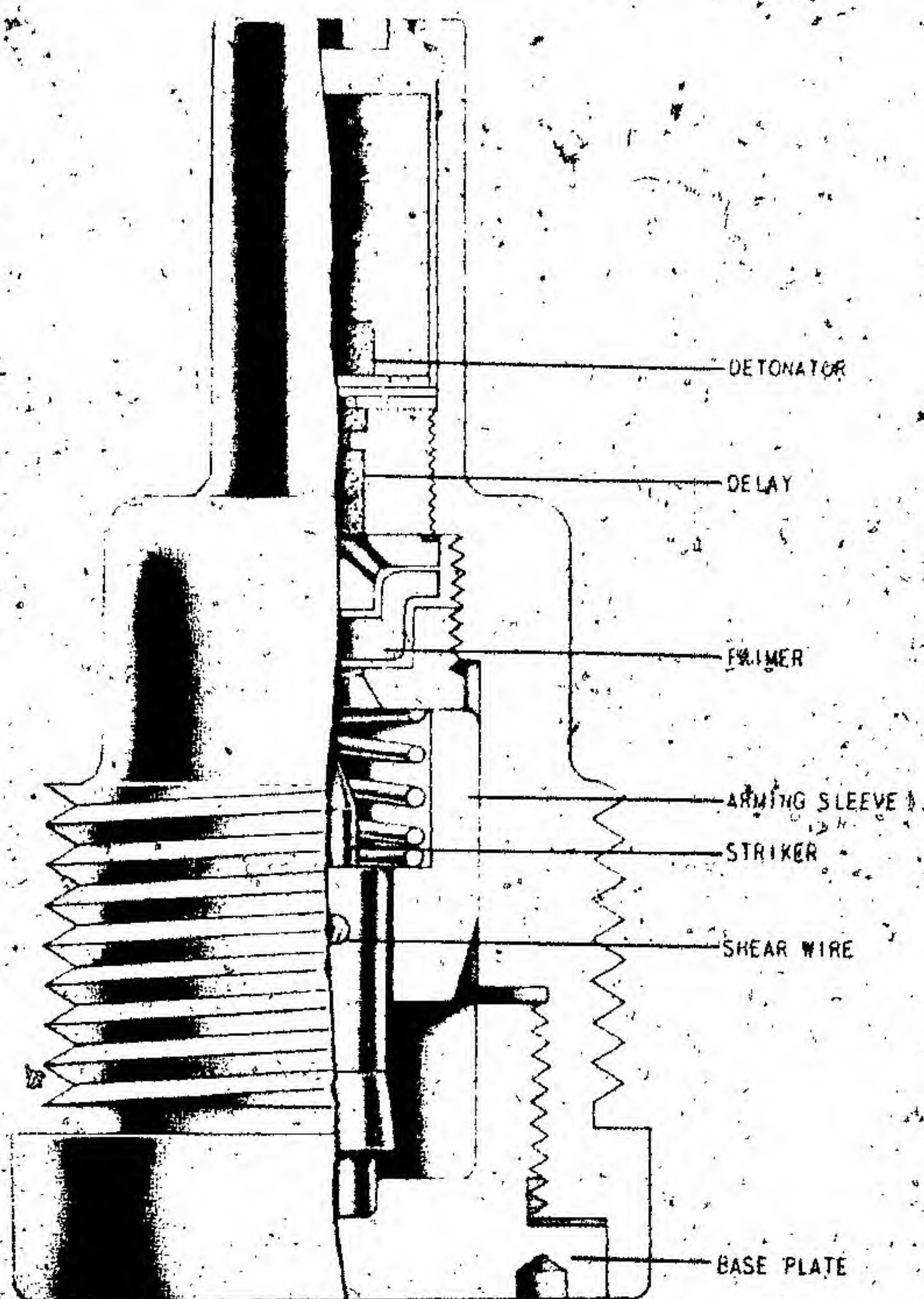


Figure 336—Type 94 Small-Delay Base Fuze.

Operation: On set-back the shear wire is broken. The arming sleeve moves back and is wedged on the after end of the striker, exposing the forward end of the striker beyond the forward end of the

arming sleeve. On impact the striker and arming sleeve, which now act as one piece, move down against the creep spring with the striker, piercing the primer.

Type 92 Small Short-Delay Base Fuze

Use: A.P. projectiles for 57-mm tank guns.

Description:

Over-all length: $2\frac{1}{8}$ inches.

Maximum diameter: $1\frac{1}{4}$ inches.

Threaded length: $2\frac{1}{2}$ inch.

Number of threads: 9.

Construction: Threaded onto the base of the fuze body is a metal cap which serves only as a cover for the centrifugal detents. Threaded into the forward section is the explosive train carrier.

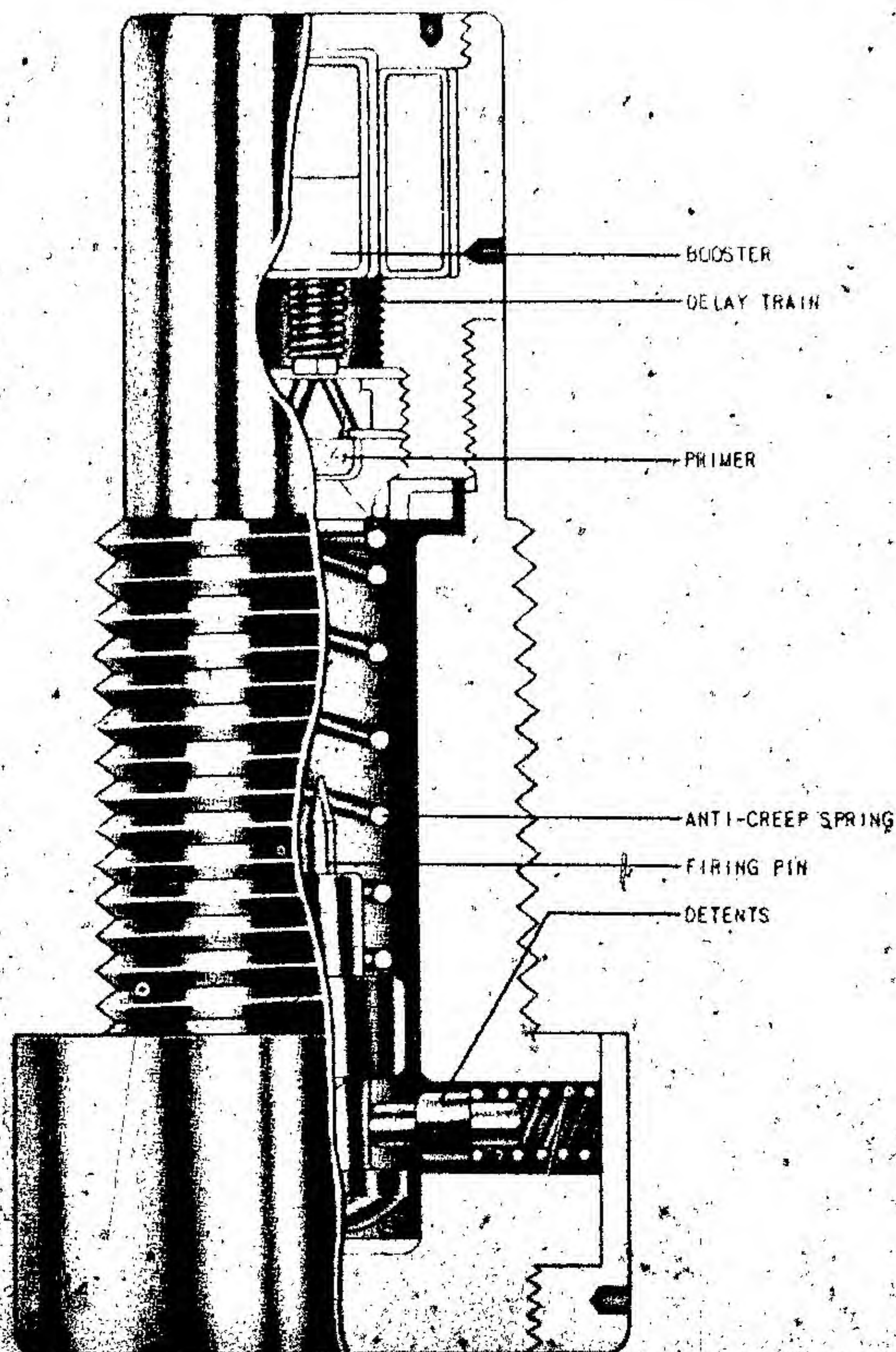


Figure 337—Type 92 Small Short-Delay Base Fuze.

The fuze body houses two centrifugal detents, a striker and a creep spring. The detents, fitting into a circular groove, hold the striker from the primer.

Operation: With centrifugal force the spring-loaded detents move out, leaving the striker free to move onto the primer on impact.

Small Mk 2 Base Detonating Fuze

Use: A. P. projectiles for the 47-mm antitank gun.

Description:

Over-all length (with gaine): $2\frac{1}{2}$ inches.

Over-all length (without gaine): $1\frac{1}{2}$ inches.

Maximum diameter: $1\frac{3}{8}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: 9 right-hand.

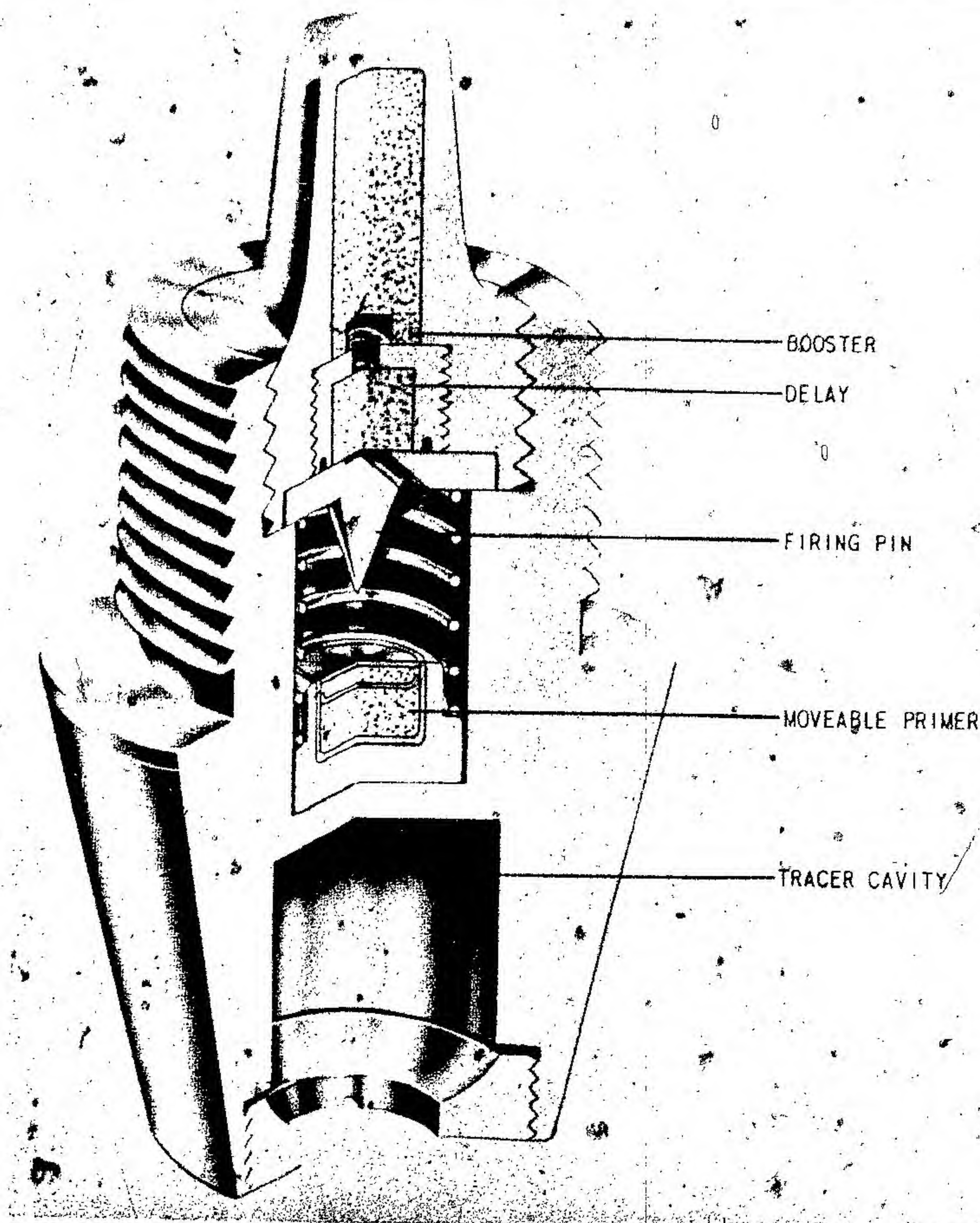


Figure 338—Mk 2 Small Base-Detonating Fuze.

Construction: This fuze is made of black steel in one piece. The rear end is drilled out to take the tracer. Housed in the forward part of the fuze and separated by a coiled spring, are a movable primer and a fixed firing pin. The firing pin contains a flash channel which leads to the explo-

sive train. The gaine is threaded (R. H.) into the front of the fuze.

Operation: There are no arming features in this fuze. On impact, the primer moves down onto the firing pin. The resulting flash passes through a small hole beside the firing pin into the gaine.

Small Mk 1 Base Detonating Fuze

Use: Type 1 37-mm A. P. projectiles.

Description:

Over-all length (with gaine): $2\frac{1}{4}$ inches.

Maximum diameter: $1\frac{3}{4}$ inches.

Threaded length: $\frac{3}{4}$ inch.

Number of threads: 7.

Construction: This fuze is identical to the small Mk 2 except for size.

Operation: The operation is the same as for the small Mk 2 fuze.

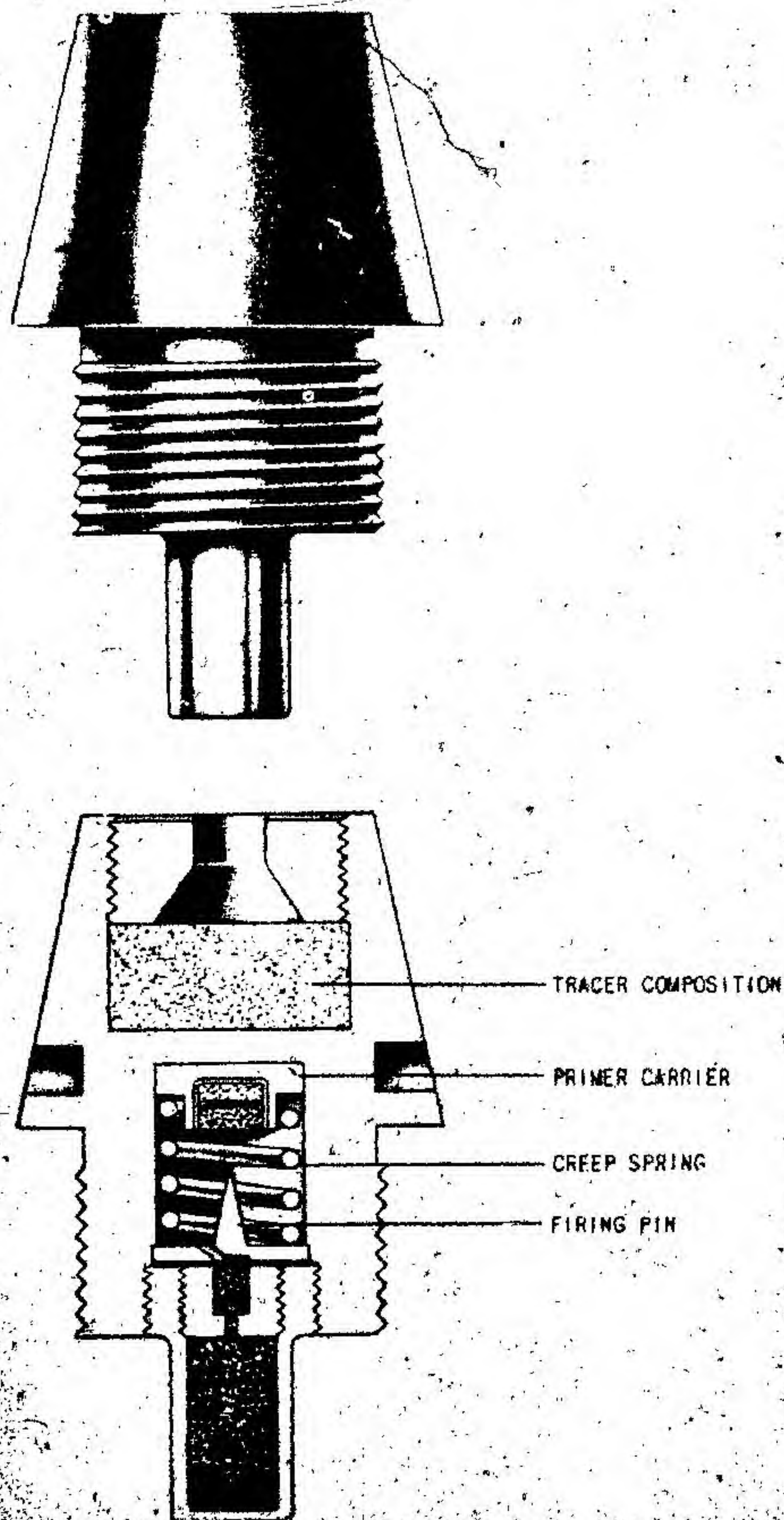


Figure 339—Mk 1 Small Base-Detonating Fuze.

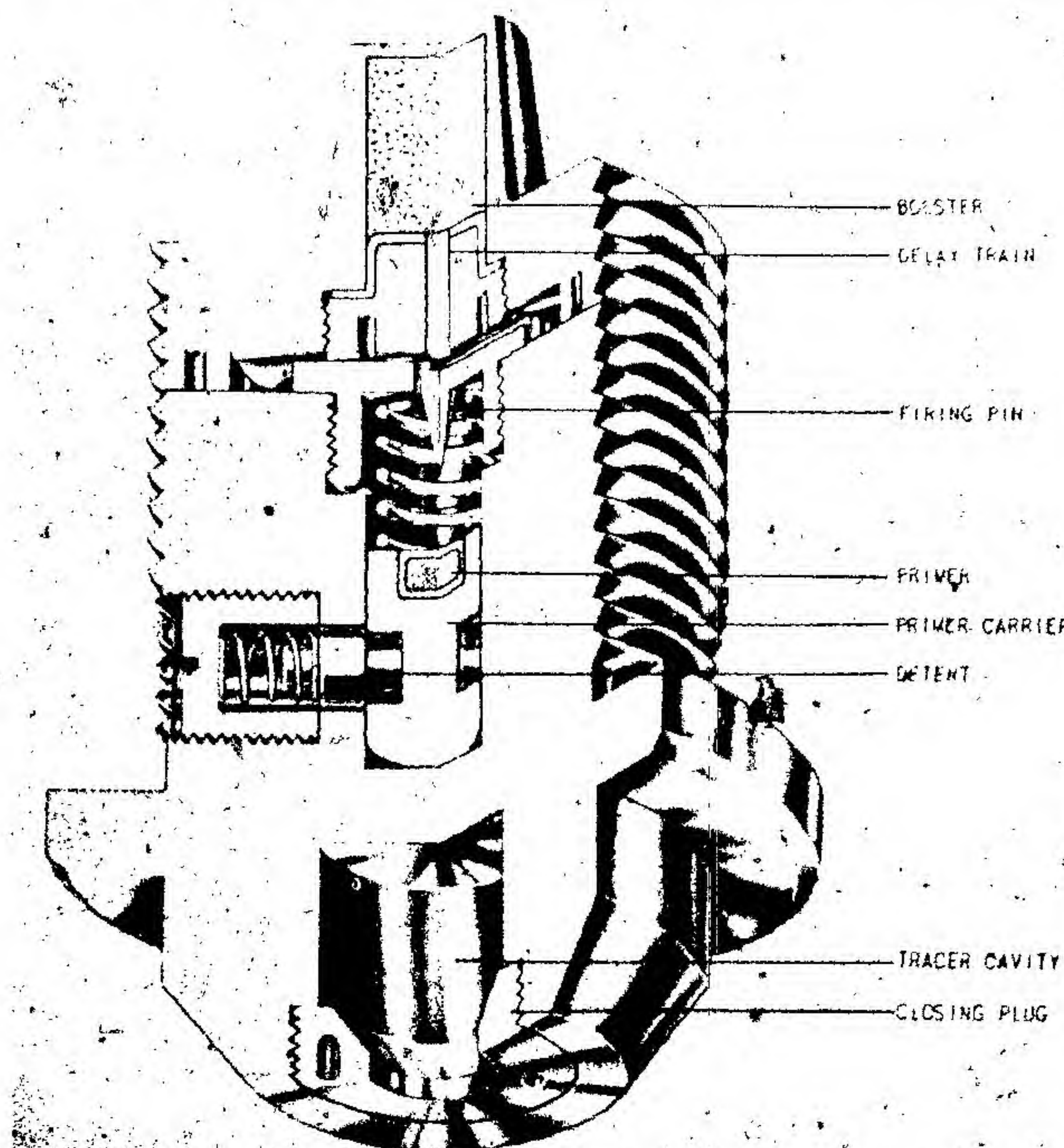


Figure 340—Mk 1 Medium Impact Base Fuze.

Medium Mk 1 Impact Base Fuze

Use: 75-mm A. P-H. E. projectiles for the type 41 and 94 mountain guns and the type 90 field gun.

Description:

- Over-all length (with gaine): No data.
- Over-all length (without gaine): 2 inches.
- Maximum diameter: $2\frac{1}{8}$ inches.
- Threaded length: $1\frac{1}{2}$ inches.
- Number of threads: 11.

Construction: This fuze is made of black steel into two separate parts, which are threaded separately into the base of the projectile. The rear part contains a tracer element which is separated from the working mechanism of the fuze by a steel partition. The working mechanism consists of

two spring-loaded detents which fit into a circumferential recess in the metal primer carrier and when in the unarmed position hold the primer carrier from the firing pin. There is a small coiled spring located between the firing pin and the primer carrier. The firing pin has two small flash channels leading down to the explosive gaine. The gaine threads into the fuze pocket with threads of the same diameter as the fuze proper.

Operation: Centrifugal force moves the detents out from the primer carrier, which is then separated from the stationary firing pin by the spring only. On impact, the primer moves down upon firing pin, flashing through the flash channels to the gaine.

Type 88 Small (Howitzer-Mortar) Base Fuze

Use: 12-cm A. P. projectile type 38 (howitzer)
and A. P. projectile for 150-mm howitzers.

Description:

Over-all length: 5½ inches.

Maximum diameter: 1½ inches.

Threaded length: ¾ inch, right-hand:

Construction: This fuze consists of an after section which houses the striker, centrifugal detents, and delay train, and a forward section housing the gaine. The base of the after section is threaded

externally to thread into the base fuze carrier. The brass striker contains a circumferential groove into which two centrifugal detents are fitted. In flight a creep spring separates the striker from the

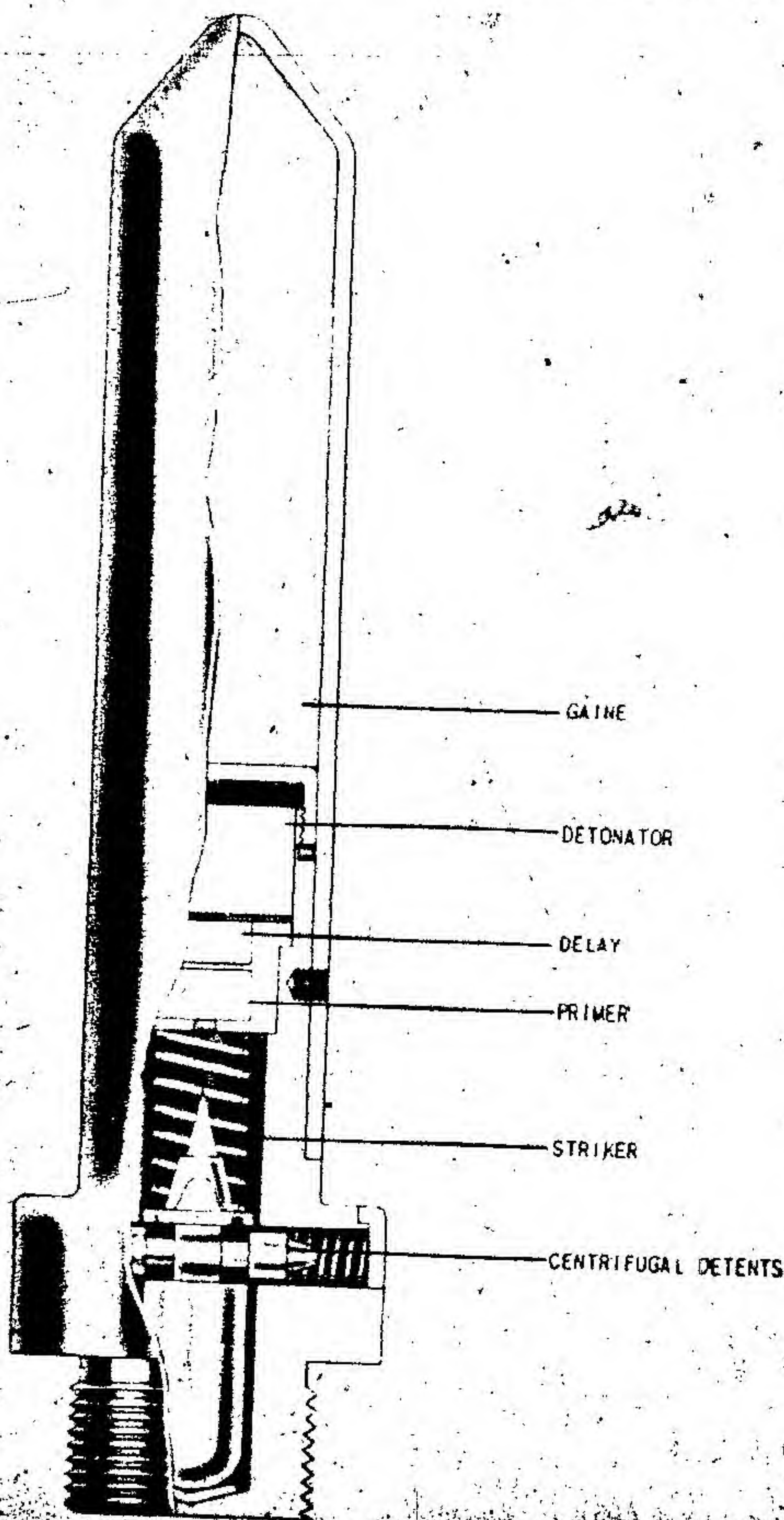


Figure 341—Type 88 Small (Howitzer-Mortar) Base Fuze.

primer. Resting between the base of the fuze and the after end of the striker is a lead disc, the purpose of which is to prevent freezing of the striker to the fuze body on setback. Housed in

the center portion of the fuze are the primer, delay pellet, and detonator.

Operation: With centrifugal force the detents move out, freeing the striker, which moves down against the creep spring on impact.

Type 88 Small (Gun) Base Fuze

Use: A. P.-H. E. for 15-cm guns.

Description:

Over-all length: $6\frac{1}{2}$ inches.

Maximum diameter: $1\frac{1}{8}$ inches.

Threaded length: $\frac{3}{8}$ inch.

Number of threads: 6.

Construction: This fuze has the same internal construction as the type 88 small base fuze (howitzer-mortar type). It differs externally in that it is slightly longer than the howitzer-mortar type and has a square top instead of a conical top.

Operation: The operation is the same as for the howitzer-mortar type fuze.

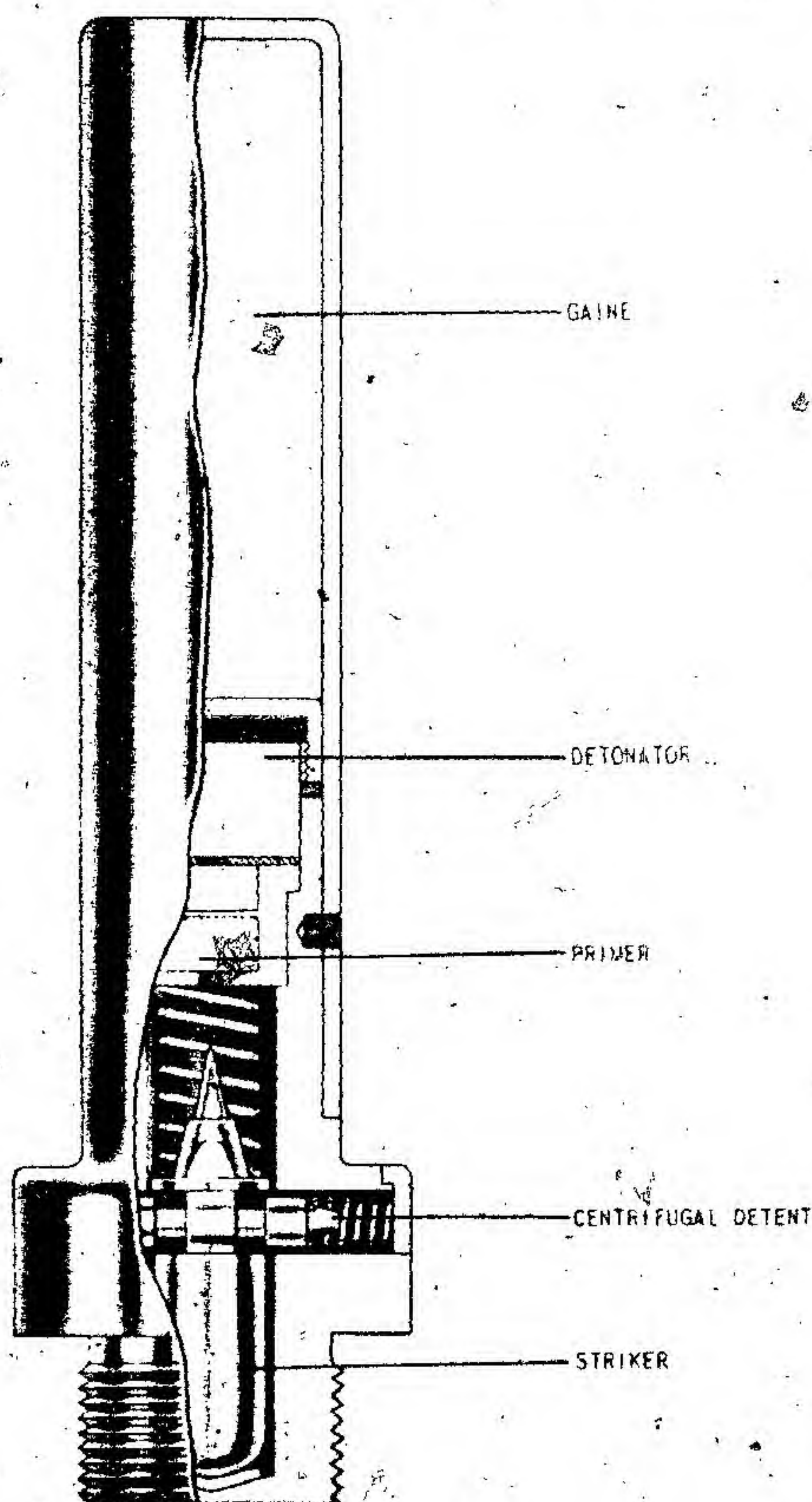


Figure 342—Type 88 Small (Gun) Base Fuze.

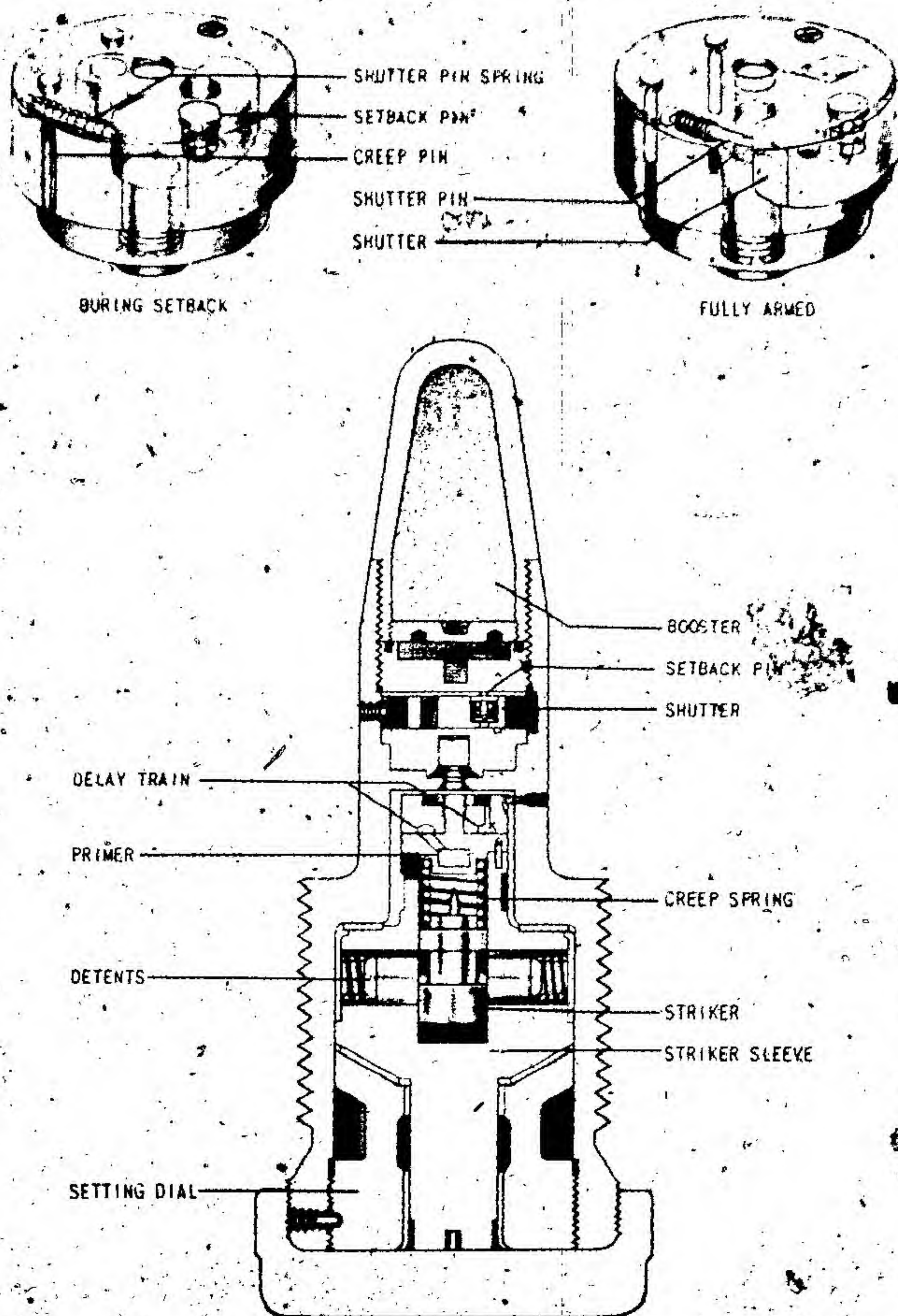


Figure 343—Type 95 Large Mk 2 Mod 1 Base Fuze.

Type 95 Large Mk 2 Mod 1 Base Fuze

Use: A. P.-H. E. projectile for 7th year type 30-cm howitzer.

Description:

Over-all length: 8 inches.

Length (without gaine): 5 $\frac{1}{2}$ inches.

Maximum diameter: 2 $\frac{1}{4}$ inches.

Threaded length: 2 inches.

Number of threads: 12, right-hand.

Construction: The fuze body is threaded externally to fit into the base plate and internally to receive the setting-dial piece in the base and the gaine in the forward end. Within the fuze body are housed the striker sleeve, centrifugal detents, striker, creep spring, primer, delay train, and shutter.

The striker sleeve is operated externally from the base of the fuze by the setting dial and controls the position of a powder time ring which in turn determines the amount of delay. The striker

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rests on a creep spring and has a circumferential groove into which the centrifugal detents fit. The shutter housing is held in the fuze body by the gaine. The shutter slide is held in place (thus interrupting the firing train) by two horizontal spring-loaded pins, one end of which is threaded to the shutter slide and the other end anchored to the shutter housing. There is a spring-loaded set-back pin housed in the shutter proper to provide bore safety.

Operation: When the projectile is fired, the set-back pin housed in the shutter moves down against its spring into the shutter housing locking the shutter to the housing. As deceleration begins, the setback pin moves into the shutter and frees it to move out. With centrifugal force, the shutter slide moves out, compressing the springs of the two horizontal pins, and presents a flash hole which opens the firing train. As creep sets in, two vertical pins move forward to lock the shutter slide pins in place and hold the shutter slide in the open position.

The centrifugal detents, holding the striker move out, freeing the striker, which moves down onto the primer on impact.

Remarks: The setting dial is graduated from 5 to 200, representing 0.05 to 2 seconds delay.



Figure 344—Type 95 Medium Base Fuze.

Type 95 Medium Base Fuze

Use: Type 95, 15 cm. A. P.-H. E.

Description:

Over-all length: $5\frac{3}{4}$ inches.

Maximum diameter: $2\frac{3}{4}$ inches.

Threaded length: $\frac{3}{4}$ inch.

Number of threads: 6.

Construction: This fuze is similar to the type 95 large Mk 2 Mod 1 base fuze, but it is smaller in

length and diameter. There is no threaded cap over the base as in the large fuze, and the firing-pin sleeve is of different construction.

The firing pin, detents, shutter, and setting dial are of similar construction in both fuzes.

Operation: The operation of the fuze is identical to that of the type 95 large Mk 2 Mod 1 fuze. The fuze is armed by setback and centrifugal force, and fires upon impact.

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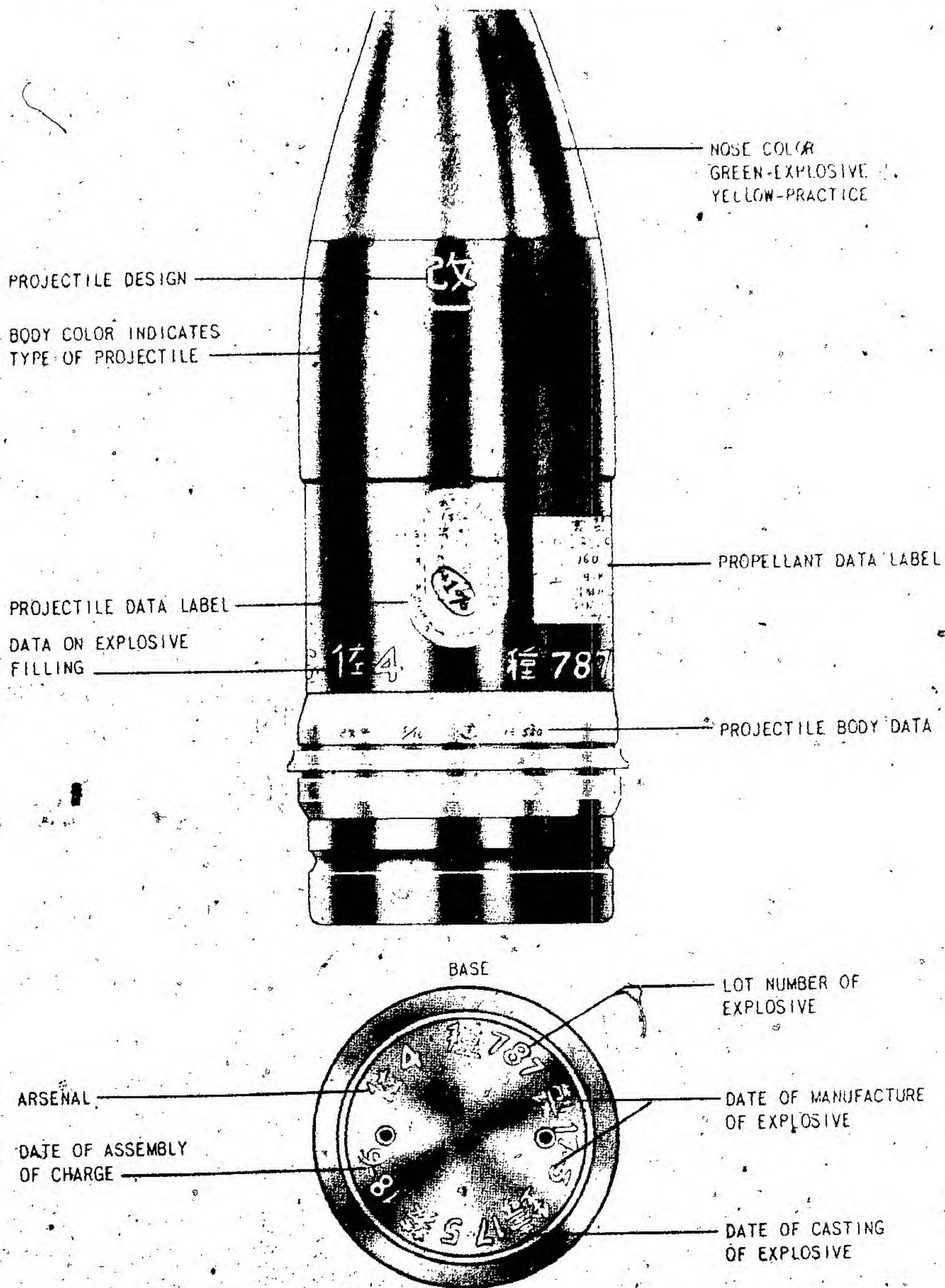


Figure 345—Markings of Japanese Navy Projectiles.

Chapter 5

NAVY AMMUNITION

COLOR SYSTEM FOR LARGE-CALIBER PROJECTILES

The Navy system of marking projectiles for all sizes over 40-mm is relatively simple and reasonably consistent. Some discrepancies exist between the standard system and recovered specimens.

The following system applies to projectiles of over 40-mm, but carries over in part into the marking of smaller-caliber ammunition.

Body color: The main color of the projectile body indicates the basic type of shell.

Type of projectile	Body color
Japanese "ordinary"*	Maroon.
Armor-piercing	White.
Illuminating (over 14-cm).	Red.
Illuminating (under 14-cm).	Blue.
Shrapnel	Gray.
Target	Green.
Smoke tracer	Orange.
Practice	Black.
Incendiary-shrapnel	Red with identifying characters.

*Japanese classification. "Ordinary" includes Common and capped Common projectiles as well as various designs of H. E. projectiles.

Color of nose: Certain additional information is indicated by the painting of the nose of the projectile as follows:

1. **GREEN NOSE.**—Indicates "explosive-filled." Specific identity of explosive is not made. Black Powder as well as H. E. is marked in this way.

2. **RED TIP ON GREEN NOSE.**—Indicates "base-fuzed," but is not used when ammunition is of the fixed type.

3. **YELLOW NOSE.**—Indicates "practice use." This is applied to standard practice projectiles, painted black, and may also be used to indicate projectiles converted from service types. Projectiles converted for practice retain their original painting except for the yellow nose.

The length of the green or yellow tip is 100 mm

for 12-cm gun and larger, 50 mm for 10- and 8-cm guns, 15 mm for 6-cm and smaller.

The length of the red tip is exactly half that of the green.

Center of gravity: The center of gravity of larger projectiles is indicated by a color band painted at the appropriate position near the middle of the body. The color of this band is varied to contrast with the color of the projectile body.

Color of projectile body	Color of band	Width of band
Maroon or blue.	Yellow	50 mm for projectiles 20-cm and above.
White	Red	20 mm for 15.5" (and under).
Black	White	10 mm on all sizes.

The center of gravity is not required to be marked on projectiles of 15-cm and under, but where projectiles of these sizes already bear the color band at the point of balance (apparently from earlier requirements) repainting is not required.

Additional features of painting:

1. A black band painted on the lower edge of a projectile cap indicates a design of cap designated "type 3-year cap."

2. Fuzes and rotating bands normally are not painted. The bourrelet is consistently painted.

3. The portion of the body between the rotating band and the base is left unpainted in projectiles of fixed ammunition, but is painted on projectiles of semi-fixed ammunition.

4. Dummy plugs resembling fuzes have the tips painted with black lacquer to distinguish them from fuzes.

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Accessory markings: Type numbers or other characters are sometimes stenciled on the ogival portion of the projectile as a further aid in identification. Some of these markings are:

- a. 九一 "91" indicating type 91 projectile design.
- b. 八八 "88" indicating type 88 projectile design.
- c. 五五 "Mk 5" indicating Mk 5 projectile design.
- d. 改一 "Modification 1" referring to projectile design, but not a complete identification.
- e. 焼霰 "Incendiary shrapnel."
- f. 乙 "B" (rare) indicating a variation in explosive charge—presumably type "B" explosive.
- g. 教練用 "For practice use."
- h. 特減用 "For use with special reduced charge."

Filling data: On Navy projectiles of the larger sizes (8-cm and above), the dates of manufacture and filling are painted or stenciled around the body of the projectile just above the rotating band, and again on the base of the projectile.

This marking usually consists of the following data in sequence as given (beginning at the right of the widest space and reading around the projectile to the right).

- a. 種 "Lot" followed by an entry like #72, M24, or 787 indicating the lot of explosive as manufactured.
- b. 製 "Manufactured" with a date like 17-3 (shows 17th year, 3d month or March 1942).
- c. 鑄 "Cast" followed by a date as above, to indicate the date the preformed block of explosive was cast.
- d. 装 "Assembled" followed by a date, indicating the date the block was installed in the projectile. This entry is sometimes omitted or incorporated into the Arsenal identification.

- e. An Arsenal Identification. This entry is not well standardized.

横 5 "Yoko 5" a Yokosuka Arsenal.

佐 4 "SA 4" a Sasebo Arsenal.

呉 18-21 "Kure February 1943" The date of assembly at Kure.

Rotating band marking: Certain information pertaining to the manufacture of the projectile body itself is stamped into the rotating band. A typical example follows:

改一 5/16 18.500

- a. "Modification One" applies to the projectile design but is not a complete designation. This sometimes appears as "⊖".
- b. 5/16 indicates 5th month, 16th year Showa (May 1941), the date of manufacture of the projectile body.
- c. 18.500 Symbol of the place of manufacture, in this case Kure. The form of the anchor varies with each factory. The place name or its abbreviation (e. g. 呉 Kure: or 佐 Sa for Sasebo) may also be included.
- d. 18.500 is the weight of the empty projectile body in kilograms. This may also be written 18 K 500.

Paper labels: Typically, but not without exception, there are two paper labels appearing externally on Navy ammunition, an oval one giving projectile data, and a square one giving propellant data. Both carry valuable information on the ammunition components, and may be read at least partially without knowledge of Japanese.

In fixed ammunition both labels appear on the projectile. In semi-fixed ammunition, the oval label appears on the projectile and the square propellant label is glued to the metal disc in the top of the propellant case. In both types, the propellant label is duplicated by a cloth label sewed to the bag enclosing the powder sticks.

Projectile data label:

PROJECTILE BODY DATA

DATE OF ASSEMBLING
(SHOWA 18-9, SEPT. 1943)

WEIGHT FILLED
(20.340 KG.)

WEIGHT VARIATION
SUPER-IMPOSED IN RED
POSITION VARIABLE



FILLED PROJECTILE DATA

DATE OF MANUFACTURE
(SHOWA 16-5, APRIL 1941)

PROJECTILE BODY WEIGHT
(18,500 KG.)

PLACE OF WEIGHING
(YOKOSUKA)

Propellant label:

NORMAL CHARGE

LOT NUMBER (99)

DATE OF
MANUFACTURE
(SHOWA 13-12,
DEC. 1938)

CHARGE ASSEMBLED;
DATE - SHOWA 14-3,
MAR. 1939
PLACE - SASEBO LOT
#572

常 装 薬 造			
薬種	30 DC		
種目	99	口別	1
薬量	5 K 375		
大薬製造	昭和 13 年 12 月		
製年月日	昭和 14 年 3 月		
填所名番號	佐第 64 號		

KIND OF POWDER
(30 DG)

THIS ENTRY NOT
UNDERSTOOD

WEIGHT OF POWDER
(5.375 KG.)

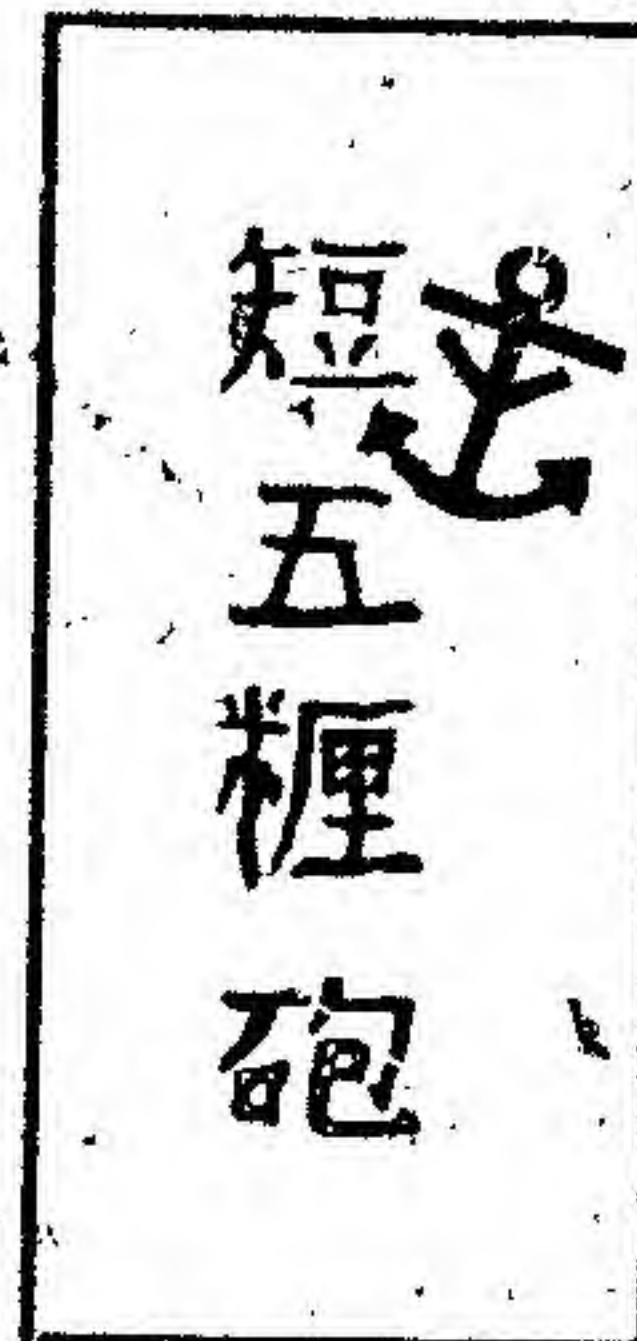
Occasionally the designation of the gun is included on the cloth label which is sewed to the propellant bag or may appear on a separate small label sewed near the propellant label.

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Examples:




"40 cal. 12.7 High-Angle Gun"



"Short 5-cm Gun"

Bursting charge label: The bursting charge for most Navy projectiles is cast in a paper container and inserted in the projectile as a separate unit and is held in place by paraffin.

A circular label on the bottom of the explosive charge carries the following data:

1. Identification of the gun (type number, etc.).
2. Identification of the projectile (type number, etc.).
3. Kind of explosive:
 Shimose (picric acid)-----

下瀬爆薬

- b. Type 91 explosive
(trinitroanisole)-----

九一式爆薬

- c. Type 92 explosive
(TNT)-----

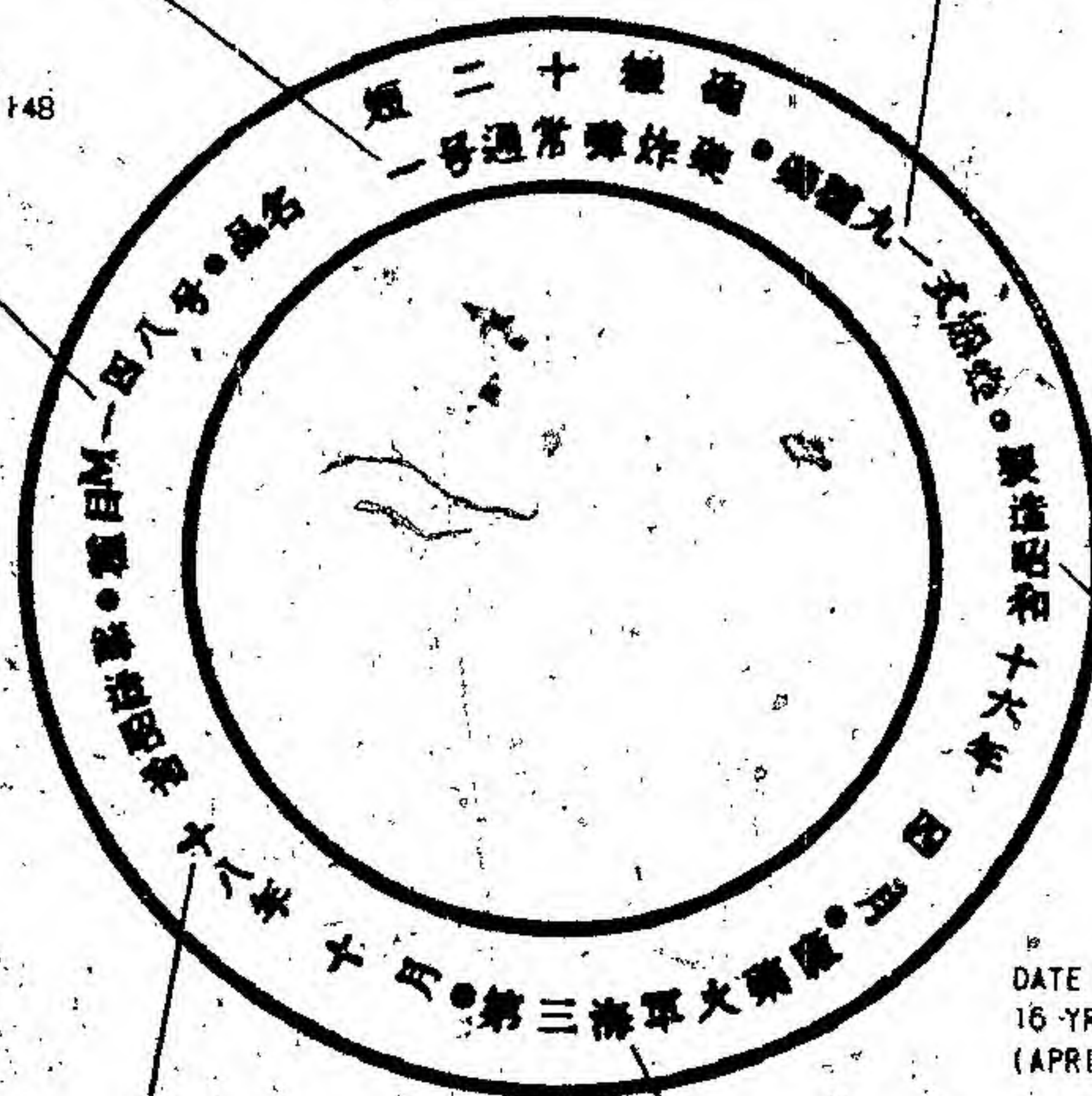
九二式爆薬

4. Lot number of explosive.
5. Date of manufacture of explosive.
6. Date of casting of the explosive block.

ITEM NAME:
SHORT 20 CM GUN BURSTING
CHARGE FOR MK I ORDINARY
PROJECTILE

KIND OF EXPLOSIVE
TYPE 91
(TRINITROANISOLE)

LOT NUMBER M 148



DATE OF MANUFACTURE
16-YR. 4 MO.
(APRIL 1941)

DATE OF CASTING
18 YR. 10 MO.
(OCT. 1943)

NO. 3 NAVAL POWDER FACTORY

COLOR SYSTEM FOR SMALL-CALIBER PROJECTILES

Certain features of marking of large-caliber projectiles carry over into the marking of smaller sizes, but in general, sizes of 40-mm and under follow no single standard identification system and are best considered as individual groups.

40-mm—Automatic antiaircraft weapon: This ammunition follows the large-caliber system in general.

Maroon with green tip: High explosive.

White with green tip: Armor-piercing (H. E. filled).

Orange: Tracer (blind loaded).

30-mm—Aircraft cannon: This ammunition follows a system independent of the large-caliber code, but common to 20-mm Navy ammunition, which is likewise for aircraft cannon. Color of projectile body indicates type of projectile.

Maroon: High explosive.

Red: H. E. tracer.

Yellow (greenish): H. E. I. (W. P.).

Black with red nose, fuzeless: Tracer.

White: Armour-piercing.

A new trend in the painting of 30-mm projectiles is to leave the body unpainted except for an identifying color band immediately behind the nose fuze.

25-mm—Automatic antiaircraft weapon: This ammunition follows the large-caliber system in part. Green tipping to indicate the presence of explosive filling was followed in H. E. and H. E.-tracer projectiles of earlier manufacture, but apparently has been abandoned in more recent lots.

Maroon (with or without green tip): High explosive.

Red (with or without green tip): H. E., tracer. Later lots only are self-destroying.

Orange (with or without green tip): H. E., tracer. Identical to red non-S. D. rounds.

Orange (with red paint around the case primer): H. E., tracer. Construction of tracer differs from above.

Green: H. E. I. (W. P.).

White (with black under coat): A. P.-T.

Projectiles sometimes appear bluish-white, white-tipped, or black due to loss of white paint.

COLOR SYSTEM FOR SMALL-CALIBER PROJECTILES

20-mm—Aircraft cannon Mk 1 and Mk 2: Color of body indicates type of projectile. White bands indicate modifications of basic design.

No bands: Un-modified design.

One band: Modification one.

Two bands: Modification two.

Three bands: Modification three.

One wide band: Modification four.

Brown: High explosive.

Red (solid nose): Tracer.

Red (fuzed): H. E. tracer.

Yellow (greenish): H. E. I. (W. P.).

White: A. P. I. (dry filling).

Black: Practice, blind loaded.

13-mm—Type 2 aircraft machine gun (fuzed ammunition): Color of body indicates type of projectile; follows aircraft cannon code.

Maroon (fuzed): High explosive.

Red (fuzed) brown band: H. E. T.

Red (fuzeless): Tracer.

Yellow (fuzed): H. E. I. (W. P.).

White (fuzeless): A. P.-T.

Black (fuzeless): Practice.

Small arms—7.7-mm, 7.9-mm, 13.2-mm: Identifying color is applied around the primer in the base of the case.

Black: Ball.

Red: Tracer.

White: Armor-Piercing.

Green: Incendiary Model 1 (W. P.).

Purple: Incendiary Model 2 (H. E.).

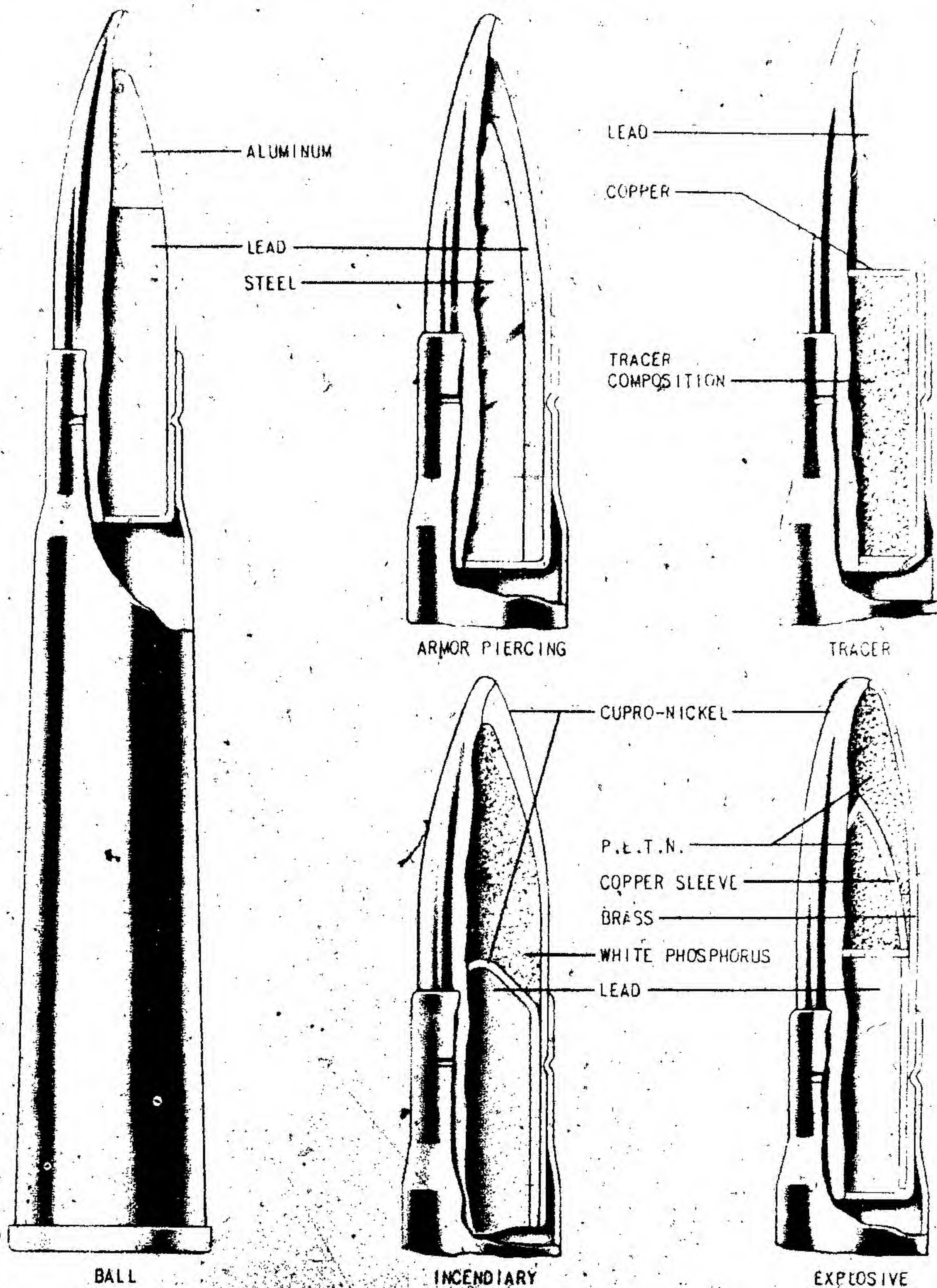


Figure 346—7.7-mm Aircraft Machine Gun Ammunition.

Chapter 5—Section 1

NAVY PROJECTILES

7.7-mm Aircraft Machine Gun Ammunition

	Ball	A. P.	Incendiary	Tracer	H. E.
Over-all length	3½ inches	3¾ inches	3¾ inches	3¾ inches	3 inches
Length of case	2½ inches	2½ inches	2½ inches	2½ inches	2½ inches
Length of projectile	1½ inches	1½ inches	1½ inches	1½ inches	1¾ inches
Weight of projectile	173.6 grams		133.2 grams	130.4 grams	

Type	Projectile jacket	Projectile core
Construction:		
Ball	CuNi	Lead
A. P.	Brass	Steel
Tracer	CuNi	Lead
Incendiary	Brass	W. P. and lead
H. E. (blunt nose)	Copper	PETN and lead

Weapons in which used:

- Type 92 A. A. M. G. (Lewis design)
- Type 92 flexible A. C. M. G. (Lewis design)
- Type 97 fixed A. C. M. G. (Vickers design)

Type	Primer color
Color and markings:	
Ball	Black
A. P.	White
Tracer	Red
Incendiary	Green
H. E.	Purple

Remarks: This ammunition is used in Navy aircraft. There is no sequence of loading.

All the rounds are rimmed. They are interchangeable with British caliber 303.

The type 92 A. A. M. G. and A. C. M. G. uses a drum magazine, and the type 97 uses a link belt feed.

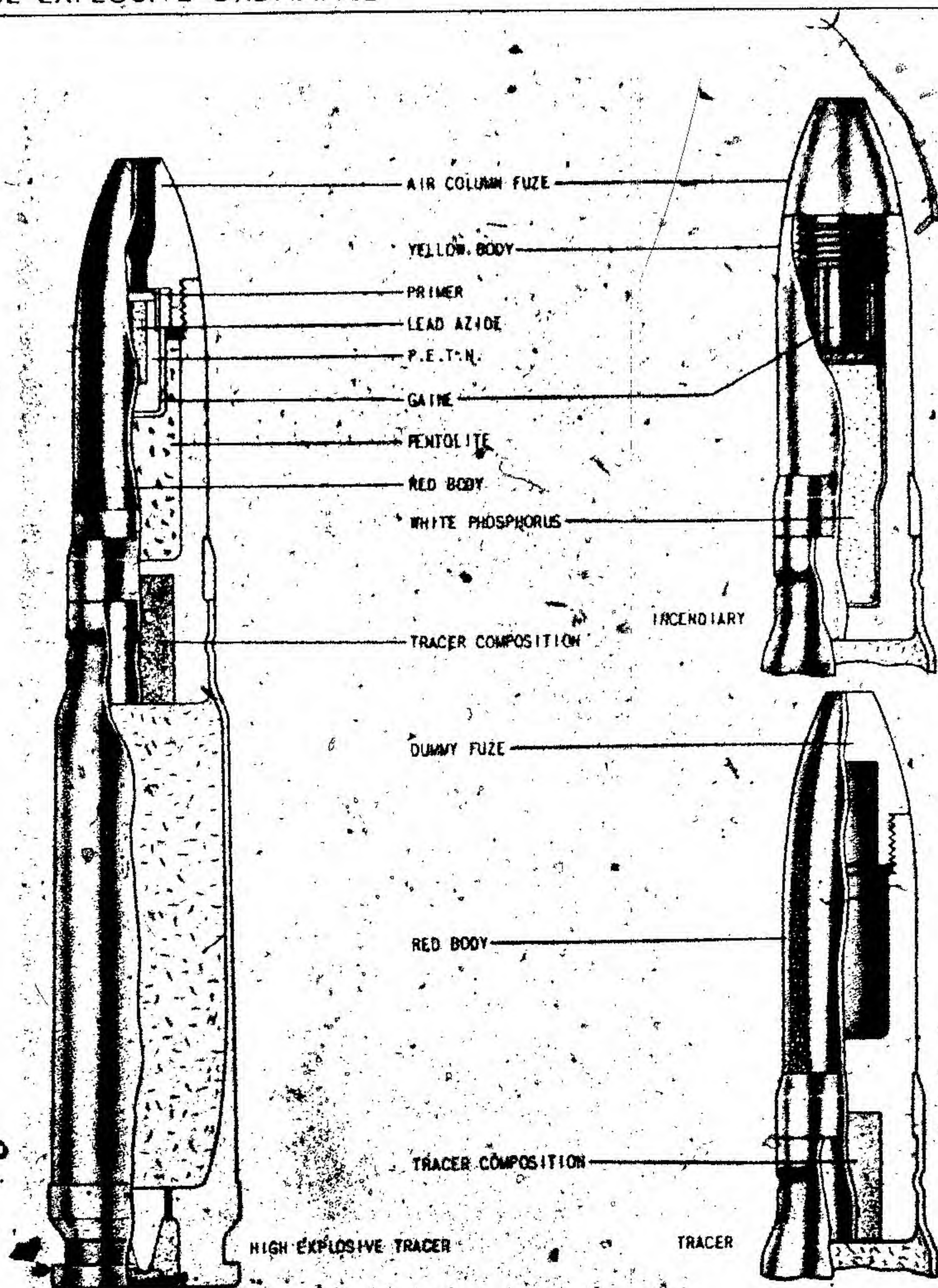


Figure 347—13-mm Aircraft Machine Gun Ammunition.

13-mm Aircraft Machine Gun Ammunition

	Tracer	A. E. T.	Incendiary
Over-all length	4½ inches	4½ inches	4½ inches
Length of case	2½ inches	2½ inches	2½ inches
Length of projectile (without fuze)	1¾ inches	1¾ inches	1¾ inches
Weight of projectile (empty)	27.2 grams	24.6 grams	24.3 grams

Type	Projectile jacket	Projectile core
Construction:		
Ball	Copper	Lead.
A. P. T.	Copper	Steel.
Tracer (dummy fuze plug)	Copper	Lead.
Incendiary	Copper	W. P. and lead.
H. E. T. (fuzed)	Copper	PETN and lead.
H. E. (fuzed)	Copper	PETN and lead.

Weapon in which used: Type 2 A. C. M. G. (copy of German 13-mm Rheinmetall-Borsig).

Type	Body color
Color and markings:	
Ball	Black.
A. P. T.	White.
Tracer	Red.
Incendiary	Yellow.
H. E. T.	Red with brown band.
H. E.	Maroon (rust).

Remarks: This ammunition has a reduced-rim brass case with a shoulder above the extractor groove. All rounds have a nose fuze or a dummy fuze plug.

The body of the projectiles are painted in distinctive colors after the system used in 20-mm aircraft cannon ammunition.

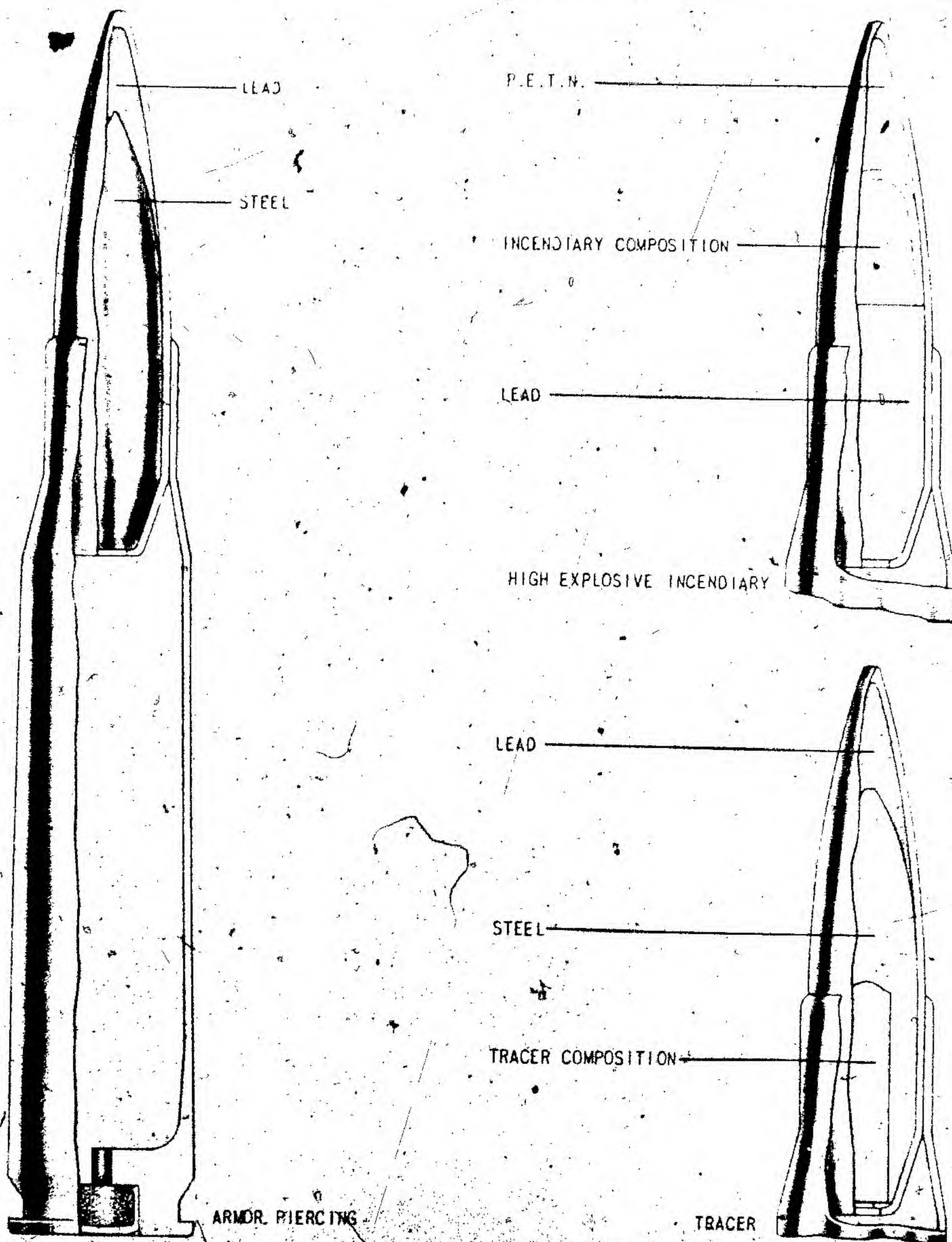


Figure 348—13.2-mm Aircraft and Antiaircraft Machine Gun Ammunition.

13.2-mm Aircraft and Antiaircraft Machine Gun Ammunition

	Tracer	A. P.	H. E. I.
Over-all length	5 1/4 inches	5 1/4 inches	5 1/4 inches
Length of case	3 1/4 inches	3 1/4 inches	3 1/4 inches
Weight of projectile (empty)	44.8 grams	51.8 grams	44.3 grams

Construction:

Type	Projectile jacket	Projectile core
Ball	Copper	Lead
Tracer	Copper	Lead
A. P.	Copper	Steel
H. E. I.	Copper	PETN and incendiary composition.

Weapons which used:

Type 93: A. A. M. G.

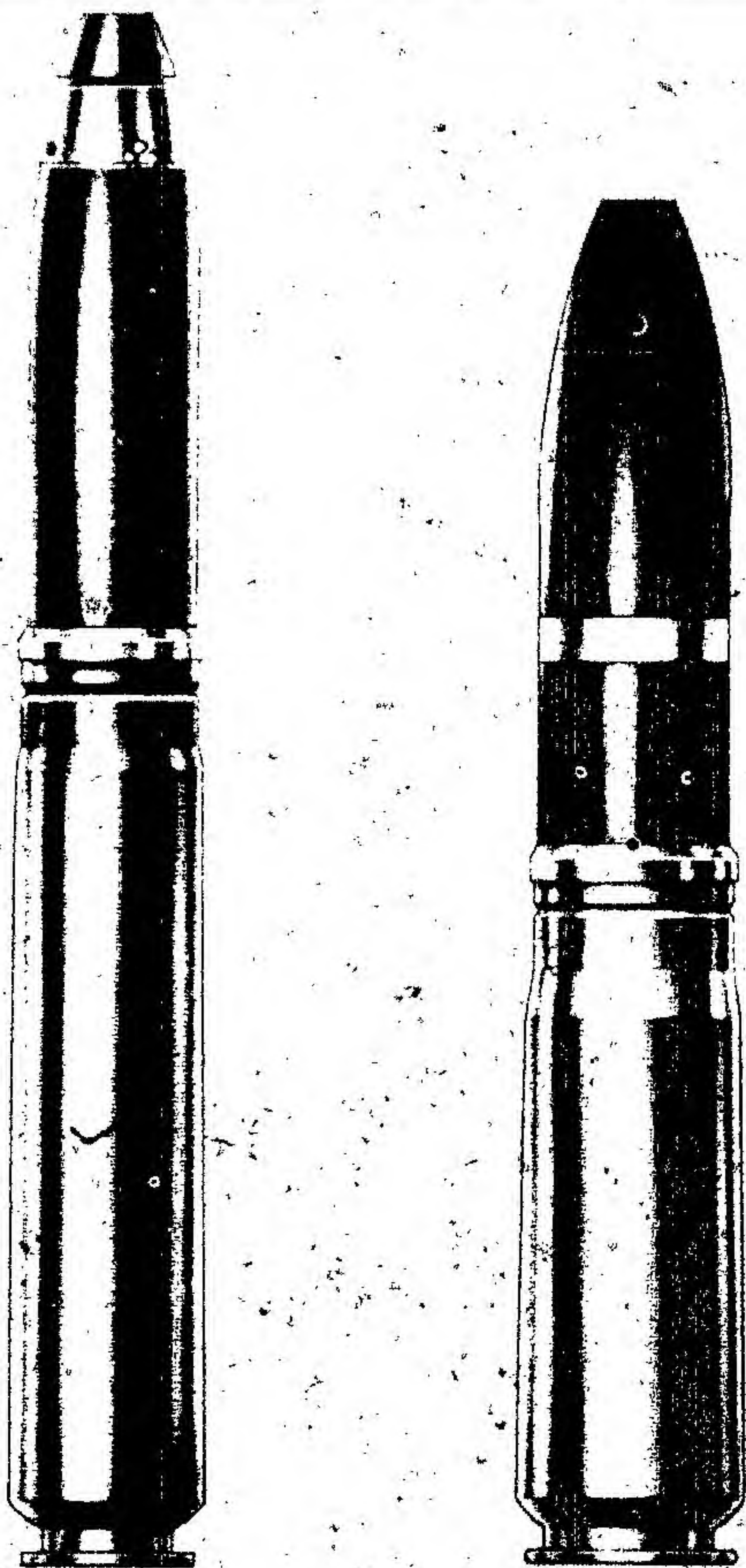
Type 3: Fixed/flexible A. C. M. G.

Color and markings:

Type	Color around primer
Ball	Black.
Tracer	Red.
A. P.	White.
H. E. I.	Yellow.

Remarks: This ammunition has a rimless brass case. It is very similar in appearance but not interchangeable with U. S. cal. .50.

The standard Navy code for marking small arms ammunition is used.



TYPE 99 MK 2

TYPE 99 MK 1

Figure 349—Type 99 20-mm Ammunition.

Type 99 20-mm Ammunition

Naval 20-mm ammunition is divided into two classes: Type 99 Mk I and type 99 Mk II. The two are distinguished by the fact that the Mk I uses a small-size cartridge case (3.79 in.), and the Mk II uses a large-size cartridge case (3.98 in.).

Both sizes use the same projectiles and fuzes, but there are a greater number of types and modifications of rounds in the smaller size.

This ammunition is a Japanese copy of the Swiss Oerlikon design. In addition to rounds of Japanese make, some of Swiss origin have been used by the Japanese.

Case	Mk I	Mk II
Length.....	3.79 inches.	3.98 inches.
Diameter at base....	0.75 inch.	0.75 inch.
Weight (empty).....	57.0 grams.	71.0 grams.
Material.....	Brass.	Brass.

The cases are of the reduced-rim type and are crimped to the projectiles by either three or six crimps at the cannellure, and sealed with a clear lacquer.

Propellant: The propellant from the Japanese-manufactured rounds is graphited, single-base, single perforated, cylindrical, nitrocellulose grains. The propellant from the Swiss rounds is single-base, graphite-coated, nitrocellulose grains, in the form of flakes. The Mk I case contains 13.6 grams of propellant and the Mk II case contains 21.4 grams of propellant.

Projectiles: In the case of Japanese manufactured ammunition, the type of projectile is indicated by painting the projectile body a solid color. Subsequent modifications of the original type are indicated by one or more white bands around the projectile body, thus:

- Original type: No bands.
- Modification 1: One 5-mm white band.
- Modification 2: Two 5-mm white bands.
- Modification 3: Three 5-mm white bands.
- Modification 4: One 10-mm white band.

All the Swiss projectiles are painted a solid color without bands.

The following dimensions are common to all projectiles:

- Distance from rotating band to bourrelet, 1.29 inches.
- Distance from rotating band to base, 0.36 inch.
- Diameter of body, 0.77 inch.
- Diameter at bourrelet, 0.79 inch.
- Diameter at base, 0.75 inch.
- Diameter at rotating band, 0.83 inch.

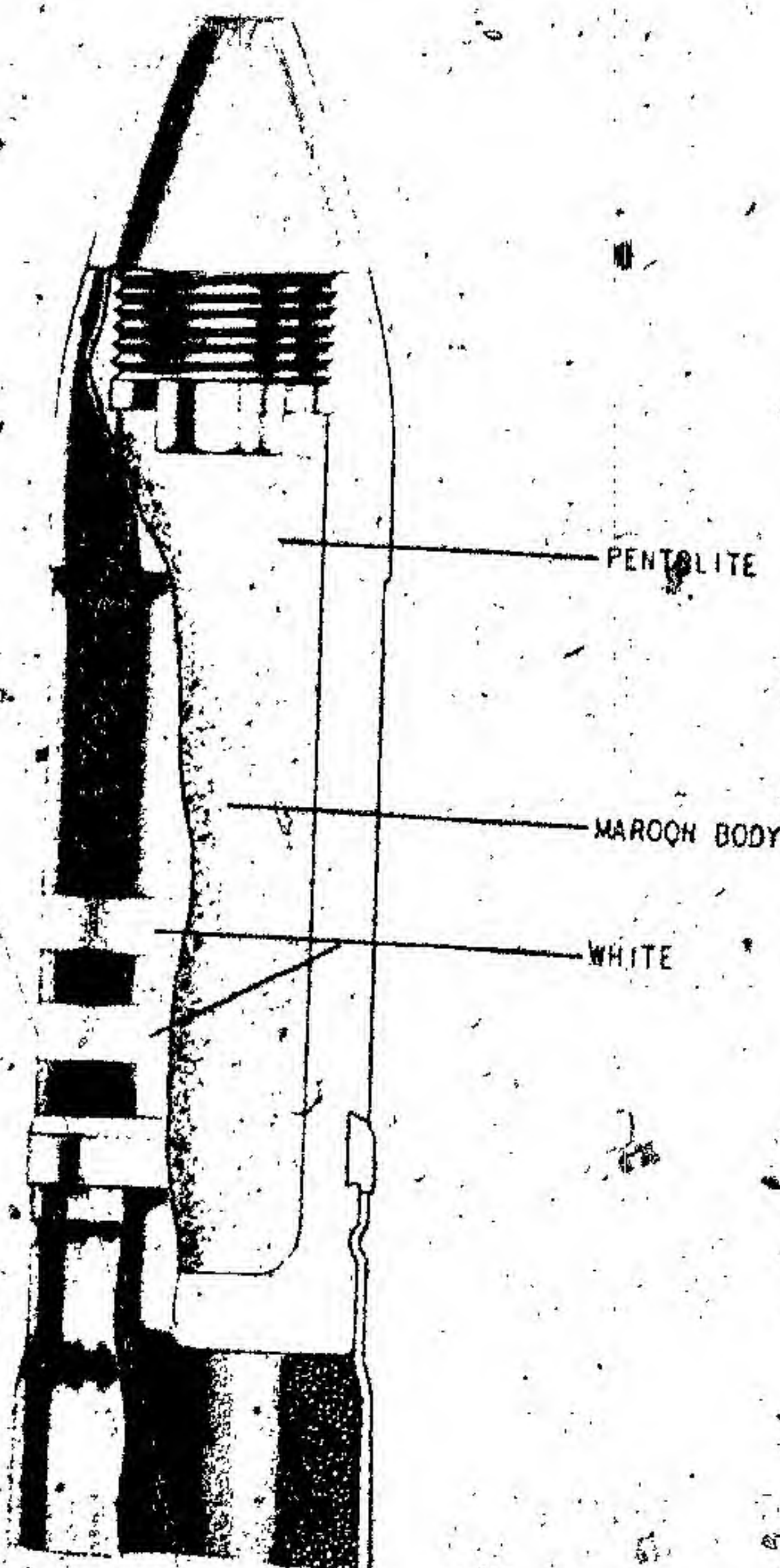


Figure 350—20-mm High-Explosive Projectile.

20-mm High-Explosive Projectile

Fuzing:

Japanese: Mod 2.

Swiss: Mod 1.

Color and markings:

Japanese: Rust brown over-all (modifications indicated by white bands).

Swiss: 1. Yellow over-all. 2. Dark brown over-all.

Weight of projectile (fuzed): 4.50 ounces.

Length of projectile (fuzed): 3.23 inches.

Length of complete round: MK I, 5.66 inches, MK II, 6.84 inches.

Filling: Pentolite (50 percent TNT, 50 percent PETN).

Weight of filling: 0.35 ounces.

Remarks: Ammunition of Swiss manufacture has been found to contain slightly more explosive than the Japanese round.

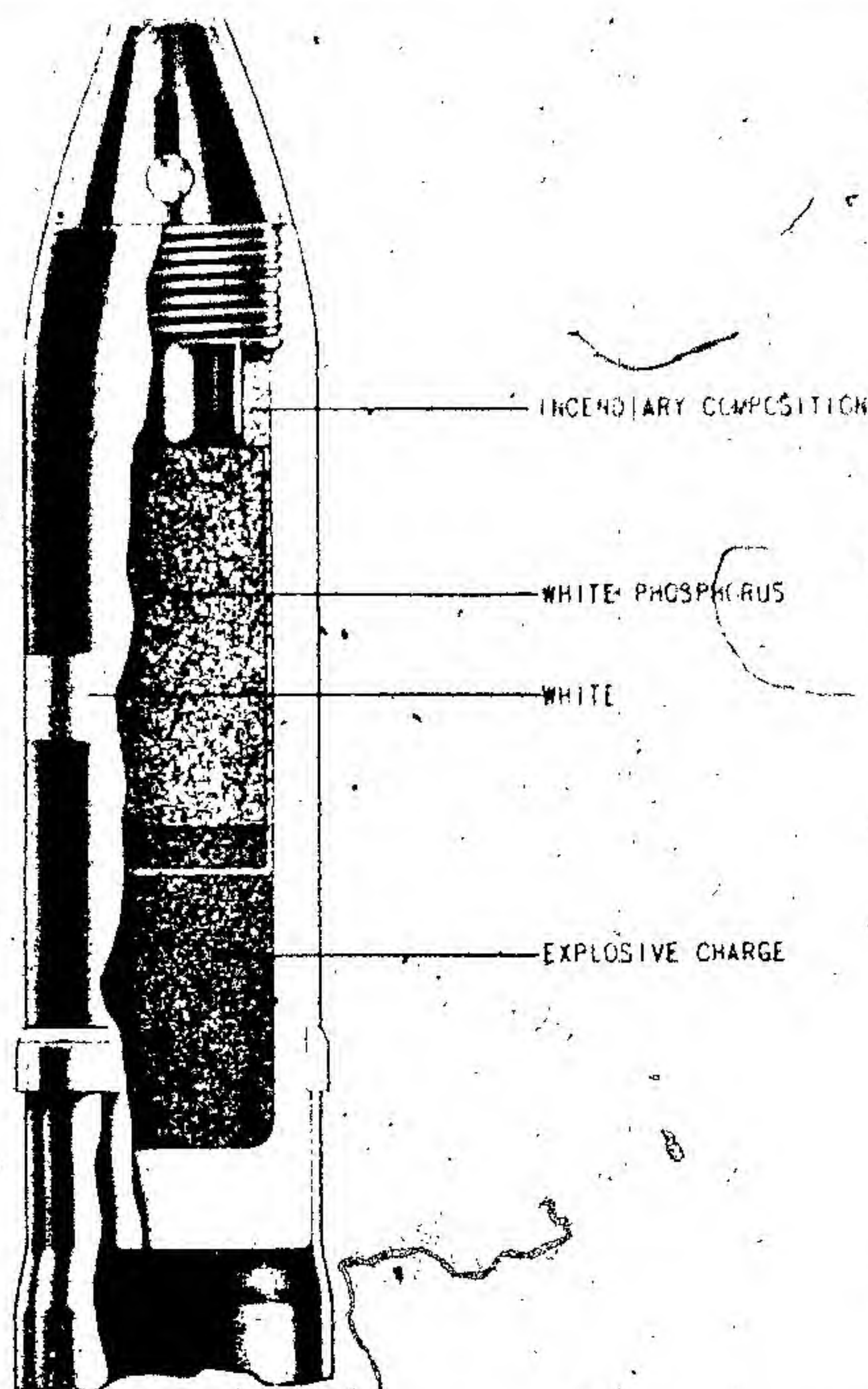


Figure 351—20-mm High-Explosive Incendiary Projectile.

20-mm High-Explosive Incendiary Projectile

Fuzing:

Basic projectile: Model 1.

Modification I: Model 1.

Modification II: Model 3.

Modification III: Model 2.

Modification IV: Model 3.

Weight of projectile (fuzed): 4.51 ounces.

Length of projectile (fuzed): 3.23 inches

Length of complete round: MK I, 5.66 inches;

MK II, 6.84 inches.

Filling:

TNT: 0.18 ounces.

WP: 0.11 ounces.

Incendiary mixture: 0.04 ounces.

Color and markings: Greenish-yellow over all, with one or more white bands to indicate modifications

Remarks: The body of all projectiles (basic and modifications) is of steel, with one cavity. The

base of the cavity contains TNT, above which is an aluminum cannister containing white phosphorus. The cannister is surrounded by a graphitized, flake nitrocellulose incendiary mixture. The Model 4 projectile eliminates the TNT and has a longer white phosphorus cannister.

Differences between the basic projectiles and subsequent modifications are principally in the fuzes and slight changes in the shape of the cavity.

20-mm High-Explosive Tracer Projectile

Fuzing:

- Basic projectile: Model 1.
- Modification I: Model 1.
- Modification II: Model 1.
- Modification III: Model 2.
- Modification IV: Model 3.
- Modification V: Two-piece fuze. (Japanese designation unknown).

Weight of projectile (fuzed): 4.51 ounces.

Length of projectile (fuzed): 3.10 inches.

Length of complete round: Mk I, 5.70 inches*
Mk II, 6.88 inches.

Filling: Pentolite (50 percent TNT, 50 percent PETN).

Weight of filling: 0.18 ounce.

Color and markings: Red over all (modifications indicated by white bands).

Remarks: The body of all these projectiles

(basic and five modifications) contains two cavities separated by a steel septum. The upper cavity contains the H. E. filling, while the lower contains the tracer. The same H. E. filling and tracer mixture are used in all instances. Differences between the basic projectile and subsequent modifications are principally in the fuzes and weight of H. E. and tracer filling used.

*The No. Model and Model 1 projectiles are 0.16 inch shorter than the other rounds.

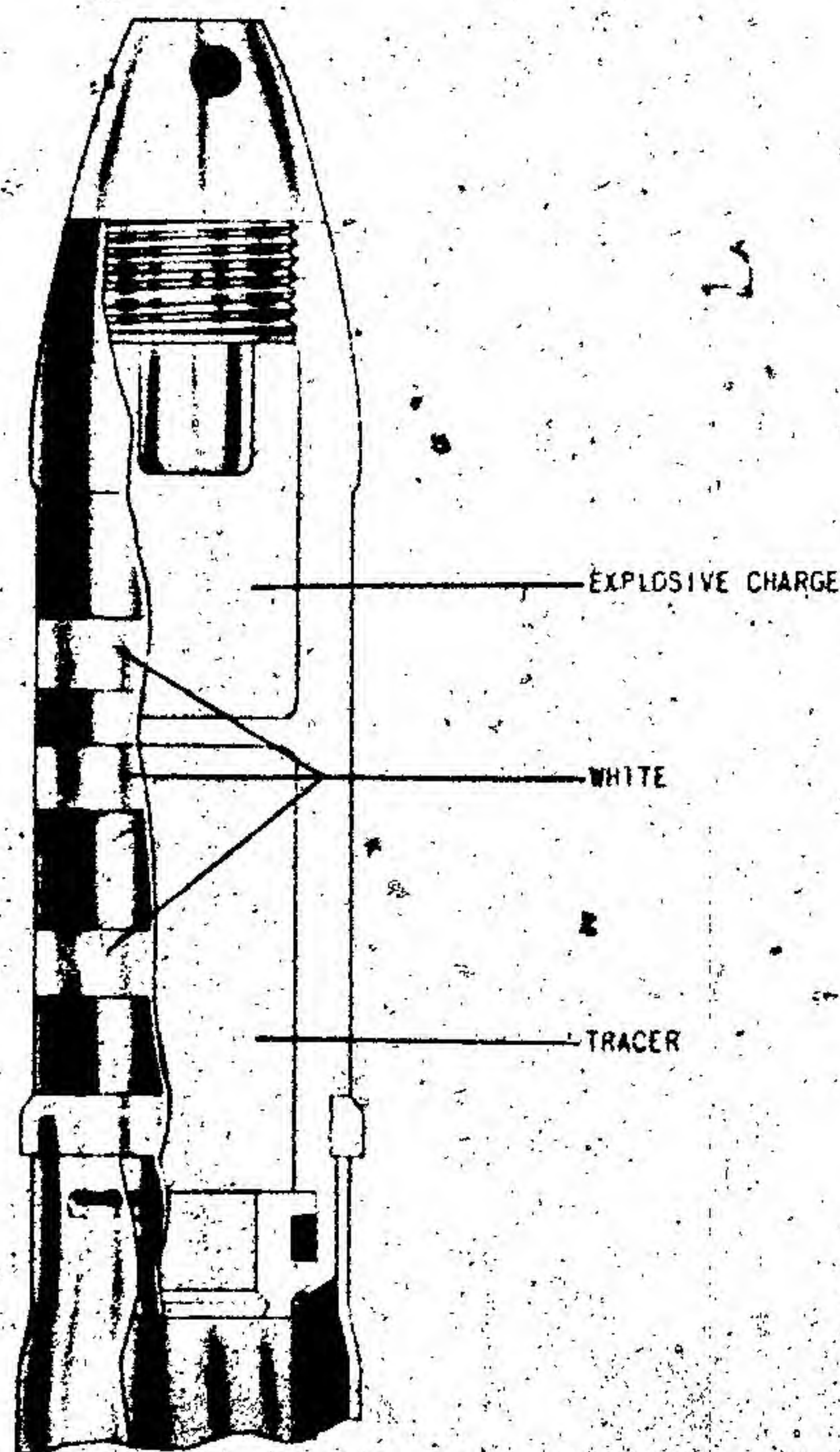


Figure 352—20-mm High-Explosive Tracer Projectile.

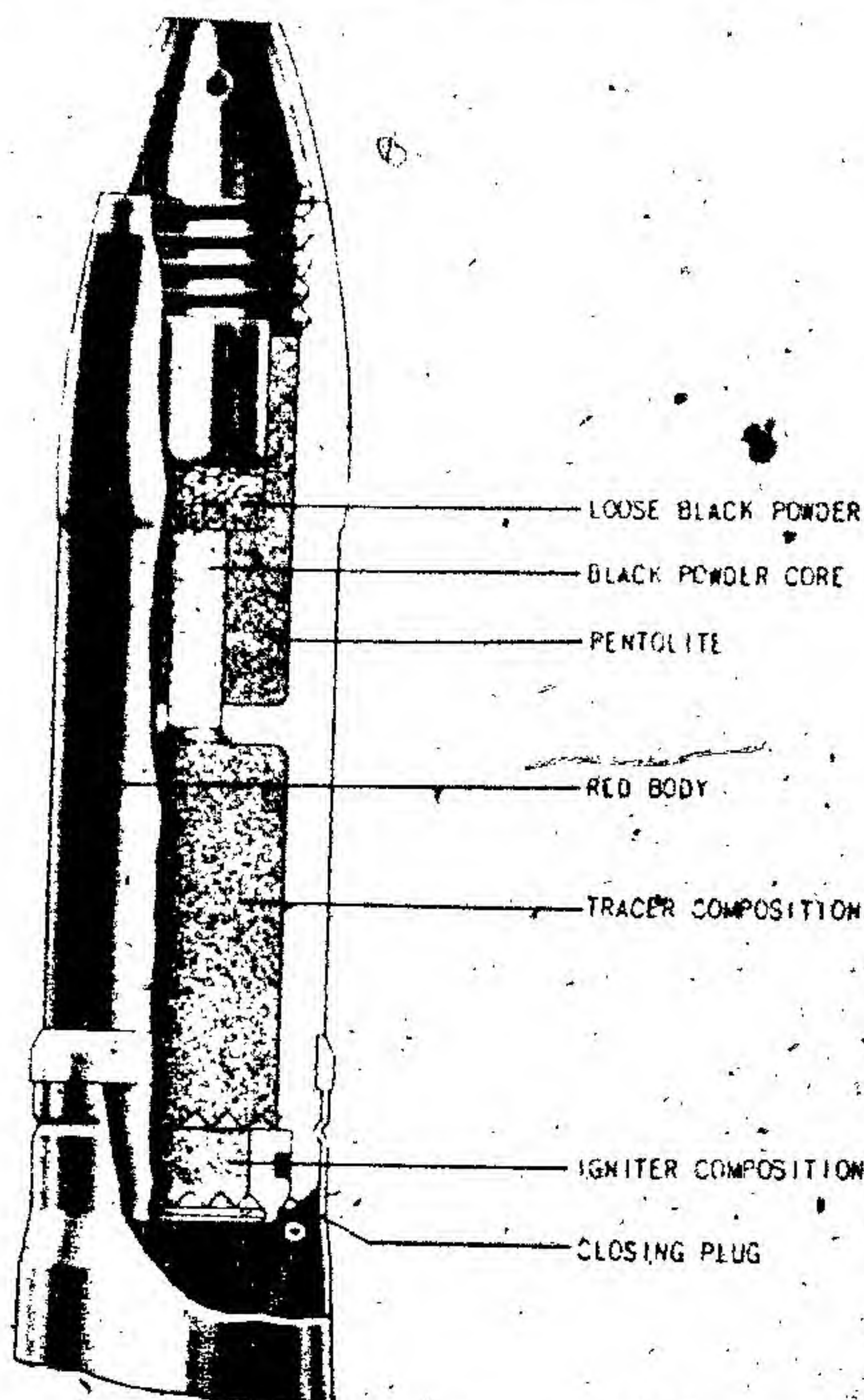


Figure 353—20-mm High-Explosive Tracer (Self-Destroying) Projectile.

20-mm High-Explosive Tracer (Self-Destroying) Projectile

Fuzing: Model 1.

Weight of projectile (fuzed): 4.50 ounces.

Length of projectile (fuzed): 3.15 inches.

Length of complete round: Mk I, 5.58 inches; Mk II, 6.76 inches.

Filling: Pentolite (50 percent TNT, 50 percent PETN).

Weight of filling: 0.15 ounce.

Color and markings: Japanese, red over all; Swiss, black over all.

Remarks: The projectiles are similar to the H. E. tracer types except for their self-destroying feature, which is accomplished by a hole drilled through the septum of the projectile. A black-powder train leads from the tracer, through the hole in the septum and the H. E. filling, to the base of the gaine.

20-mm Armor-Piercing Incendiary Projectile

Fuzing: None.

Weight of projectile: 4.64 ounces.

Length of projectile: 3.15 inches.

Length of complete round: Mk I, 5.58 inches; Mk II, 6.76 inches.

Filling: Incendiary mixture:

1. Nitrocellulose: 77.5 percent.
2. Sodium nitrate: 11.3 percent.
3. Aluminum: 11.2 percent.

Weight of filling: 0.12 ounce.

Color and markings: White over-all.

Remarks: The projectile is unfuzed and has a pointed steel body and a soft copper cap soldered to the nose. The incendiary filling loaded through the base is sealed with a threaded base plug.

Upon impact, the rear end of the projectile ruptures and the heat generated ignites the incendiary filling.

No modifications or similar Swiss ammunition exist.

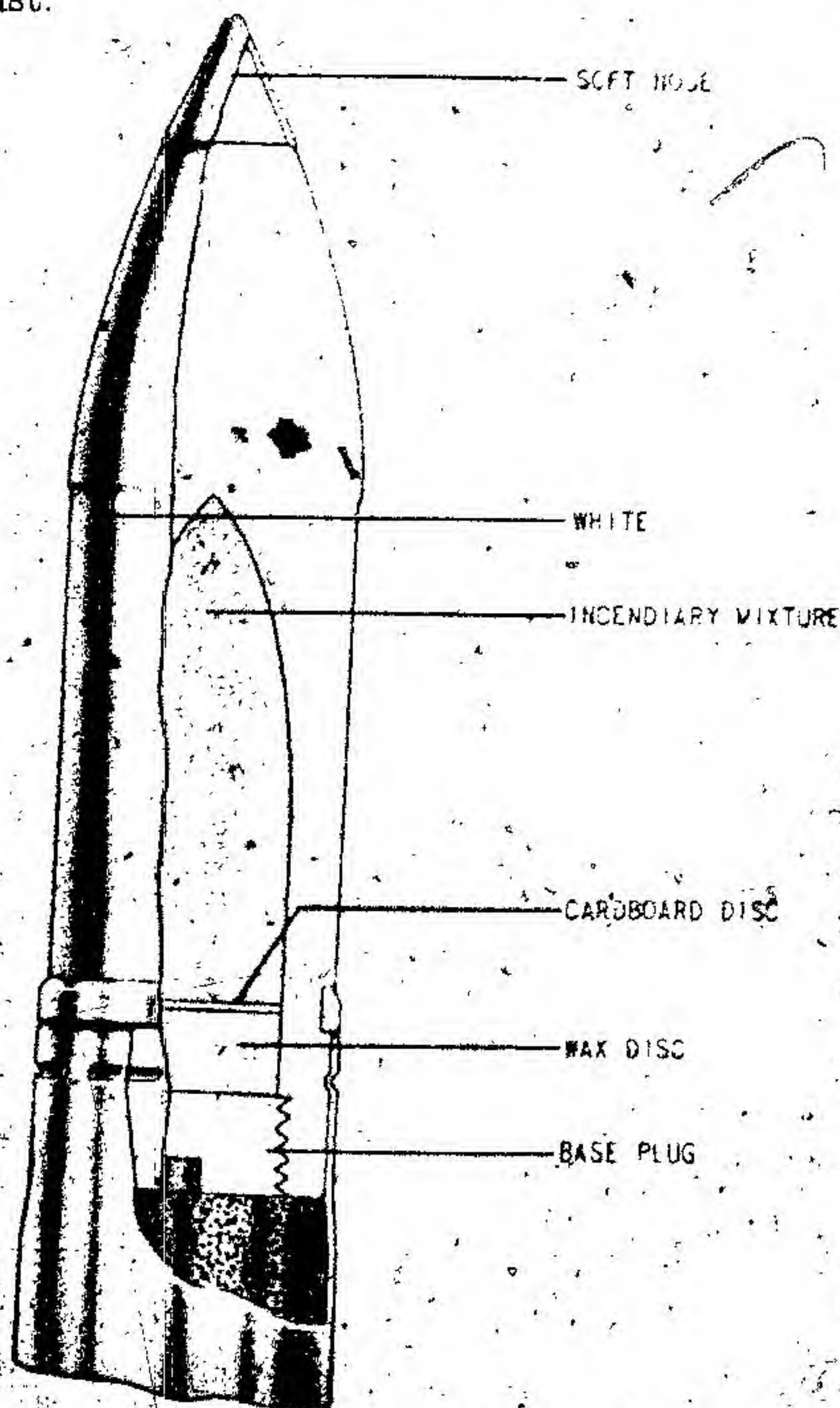


Figure 354—20-mm Armor-Piercing Incendiary Projectile.

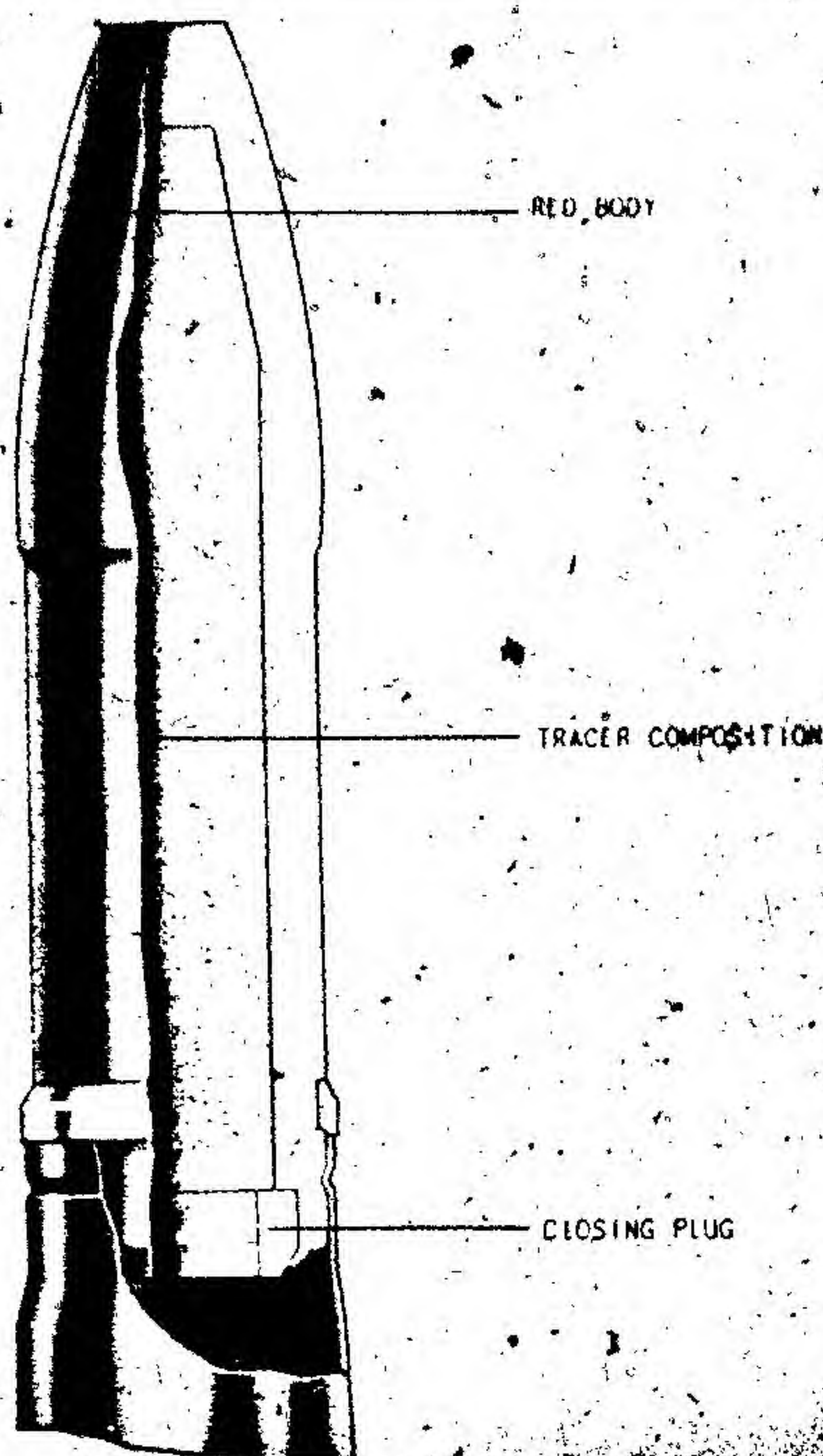


Figure 355—20-mm Tracer Projectile.

20-mm Tracer Projectile

Fuzing: None.

Weight of projectile: 4.44 ounces.

Length of projectile: 3.23 inches.

Length of complete round: Mk I, 5.66 inches;
Mk II, 6.84 inches.

Filling: Tracer mixture.

Weight of filling: 0.31 ounce.

Color and markings: Red over all, (modifications indicated by white band).

Remarks: The projectile is unfuzed; has a blunt nose and a long cavity containing the tracer element. It is loaded so as to be the first round fired to break the muzzle cover. It is, therefore, often referred to as a "bag-buster."

In addition to the basic Japanese type, Modifications II and III exist, as well as a similar round of Swiss make. The weight of tracer constitutes the difference in the Japanese modifications.

20-mm Practice Projectile

Fuze: None.

Weight of projectile: 4.45 ounces.

Length of projectile: 3.23 inches.

Length of complete round: Mk I, 5.66 inches;
Mk II, 6.84 inches.

Filling: None.

Color and markings, black over all.

Remarks: The projectile is unfuzed and has a blunt nose. It has an empty cavity which is closed at the base with a crimped steel plug. No modifications exist.

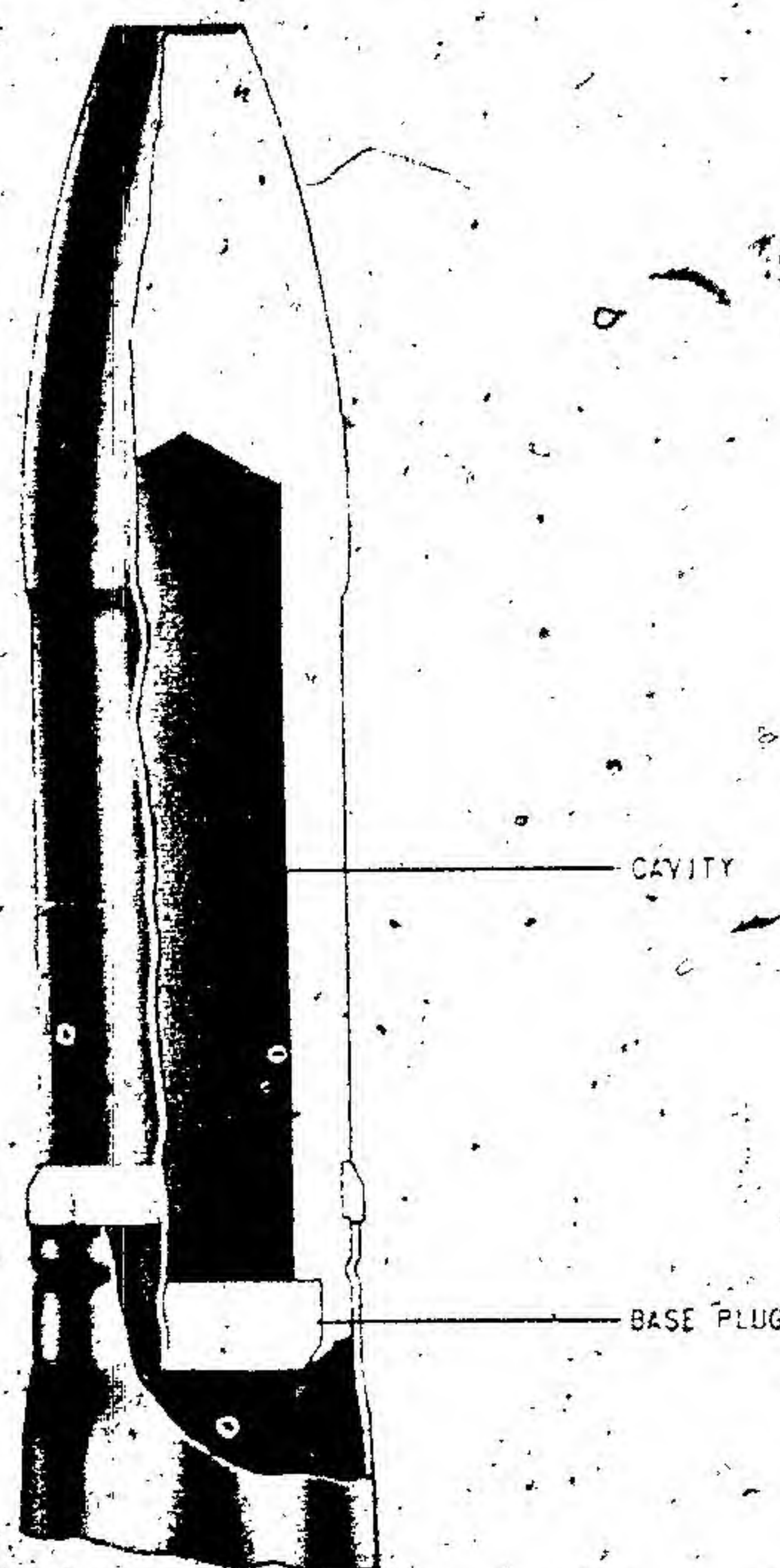


Figure 356—20-mm Practice Projectile.

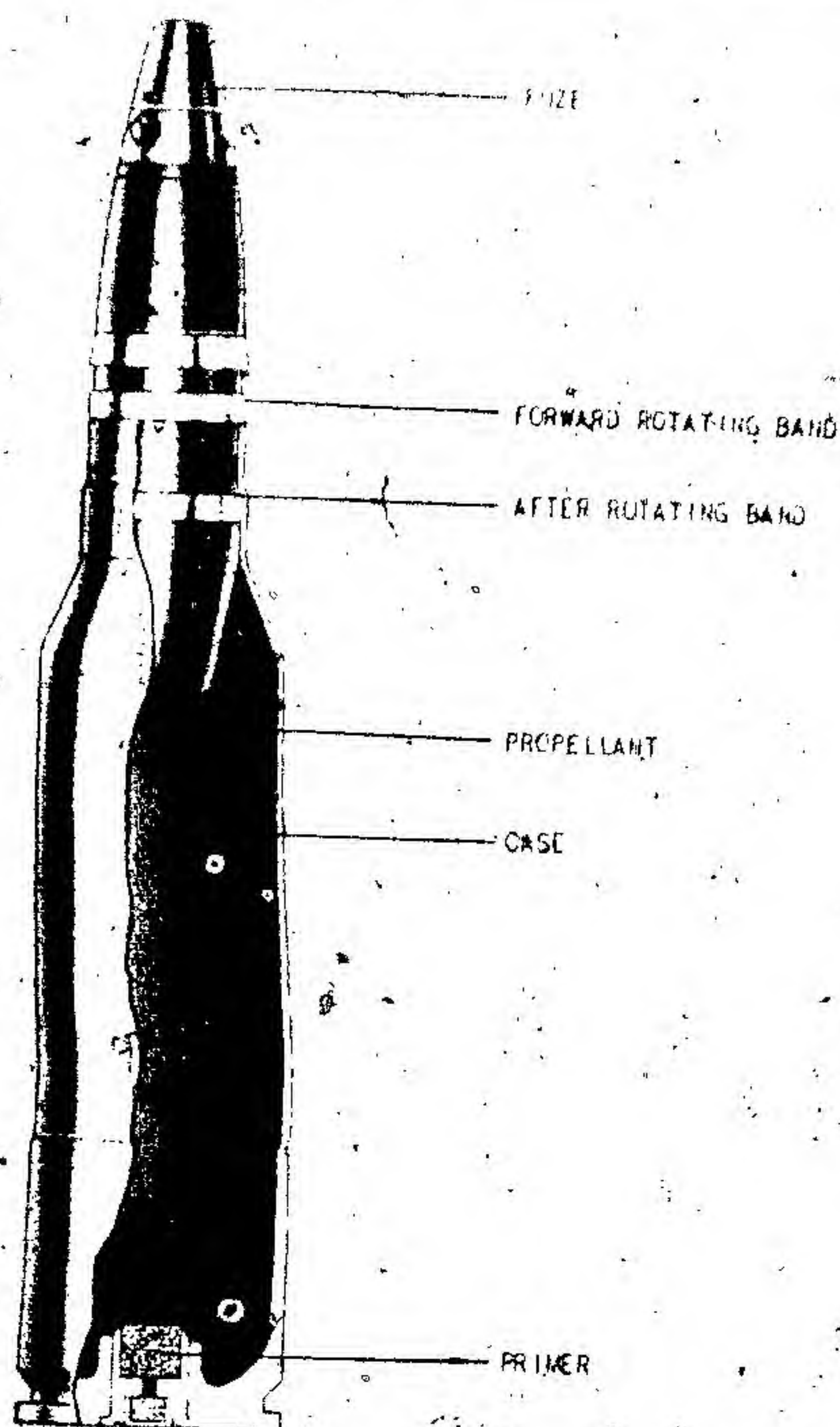


Figure 357—25-mm Ammunition.

25-mm Ammunition

The only 25-mm gun in use by the Japanese was the type 96 Model 2 antiaircraft/antitank gun. This is a multiple-barreled, air-cooled, magazine-fed, automatic weapon.

Case: The case is rimless; has a slight taper and a pronounced neck, which is crimped over the after rotating band of the projectiles.

Length: 6.46 inches.

Diameter of base: 1.65 inches.

Material: Brass.

Weight (empty); 333.5 grams.

Propellant: The propellant is single-perforated, graphited grains of nitrocellulose. The grains are 2 mm in diameter and from 2.5 mm to 4.5 mm in length. The propellant weight is 102 grams.

Projectiles: The type of projectile is indicated by painting the projectile body a solid color.

The following dimensions are common to all projectiles:

Projectile diameter: 0.96 inch (24.5 mm).

Width of rotating bands:

Forward: 0.71 inch.

Aft: 0.24 inch.

25-mm High-Explosive Projectile

Fuzing: Model 1 or Model 4.
 Weight of projectile, filled (without fuze): 7.04 ounces.
 Weight of projectile filling: 54 ounces.
 Fillings:
 Standard: TNT, 66 percent; aluminum, 34 percent.
 Alternates: 1. Cast TNT; 2. Tetryl.
 Color and markings: Maroon over all.
 Dimensions:
 Length of projectile (without fuze): 3.58 inches.
 Length of assembled round: 8.27 inches.

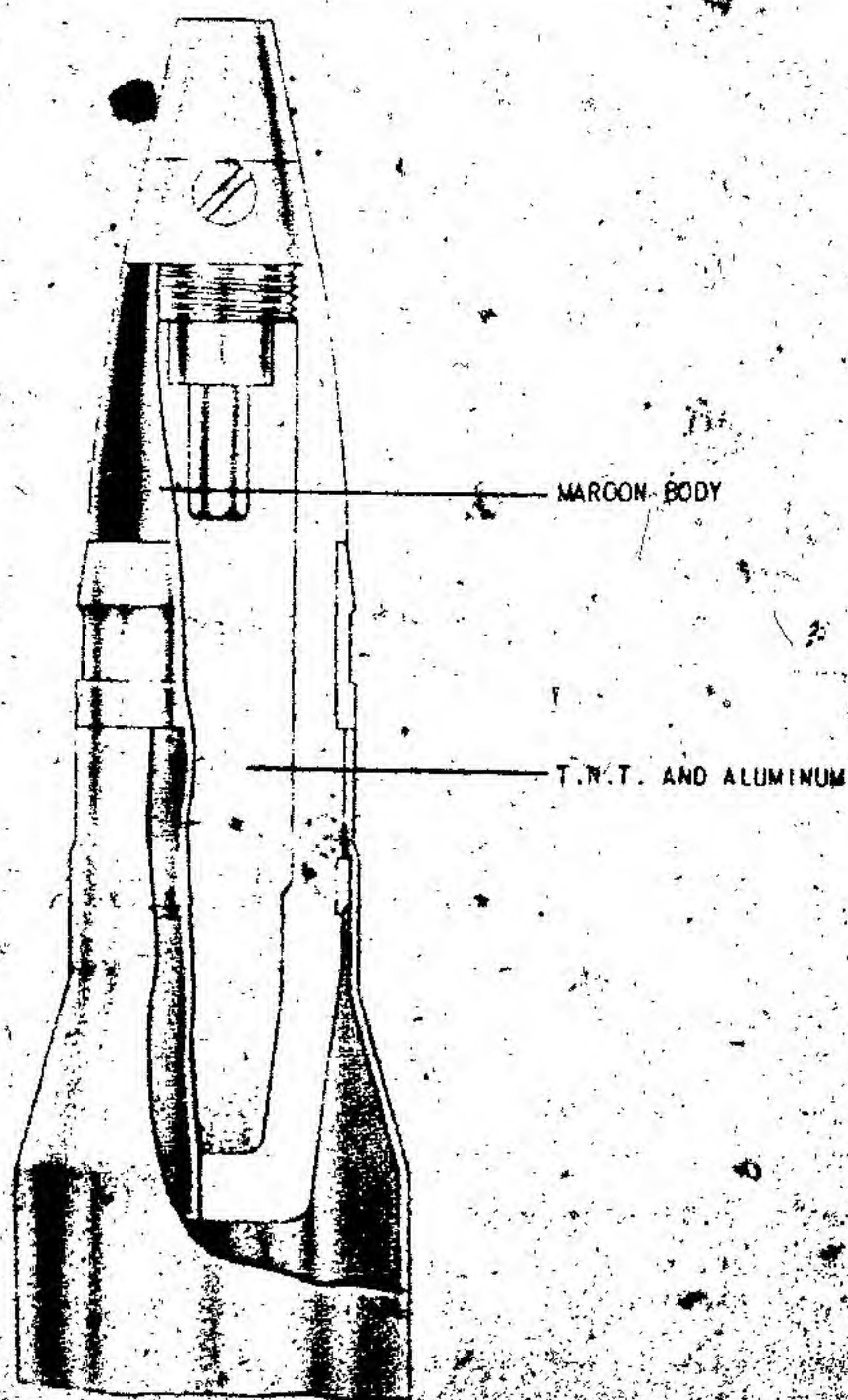


Figure 358—25-mm High-Explosive Projectile.

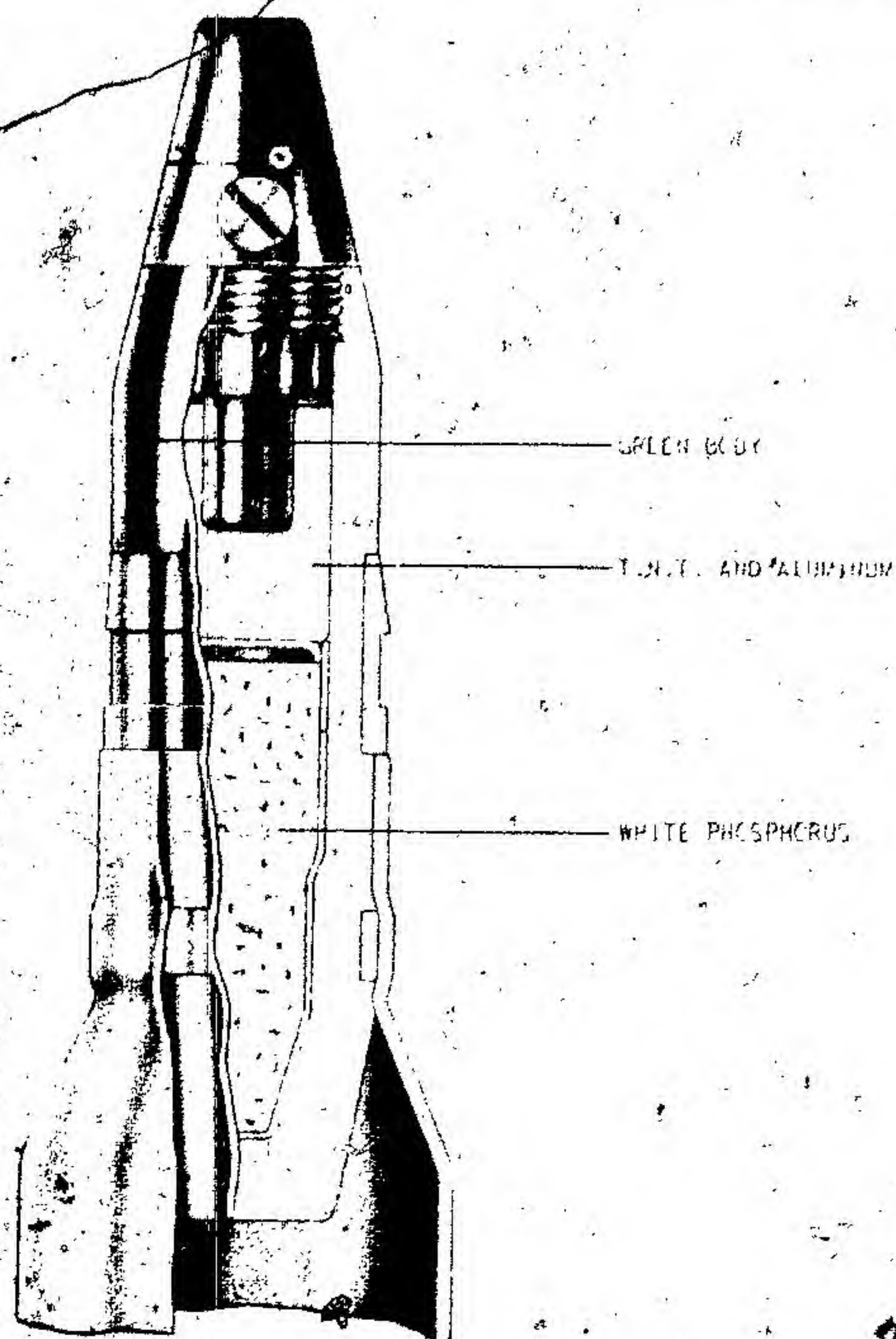


Figure 359—25-mm High-Explosive Incendiary Projectile.

25-mm High-Explosive Incendiary Projectile

Fuzing: Model 1 or Model 4.
 Weight of projectile, filled (without fuze): 7.17 ounces.
 Length of projectile (without fuze): 3.58 inches.
 Length of complete round: 8.27 inches.
 Filling:
 TNT and aluminum: 0.20 ounce.
 White phosphorous: 0.47 ounce.
 Weight of projectile filling: 0.67 ounce.
 Color and markings: Green over all.

JAPANESE EXPLOSIVE ORDNANCE

25-mm High-Explosive Tracer Projectile

Fuzing: Model 1 or Model 4.

Weight of projectile (approximately) filled (without fuze): 4.16 ounces.

Length of projectile (without fuze): 3.43 inches.

Length of assembled round: 8.24 inches.

Weight of projectile filling (including tracer): 0.72 ounce.

Fillings: H. E. T.

Standard: Three pellets of TNT and aluminum

Alternates: 1. Three pellets of TNT. 2. Cast or pressed tetryl.

Color and markings: Orange or red over all.

Remarks: The only discernible difference between the orange and red rounds is a slight disagreement in weight.

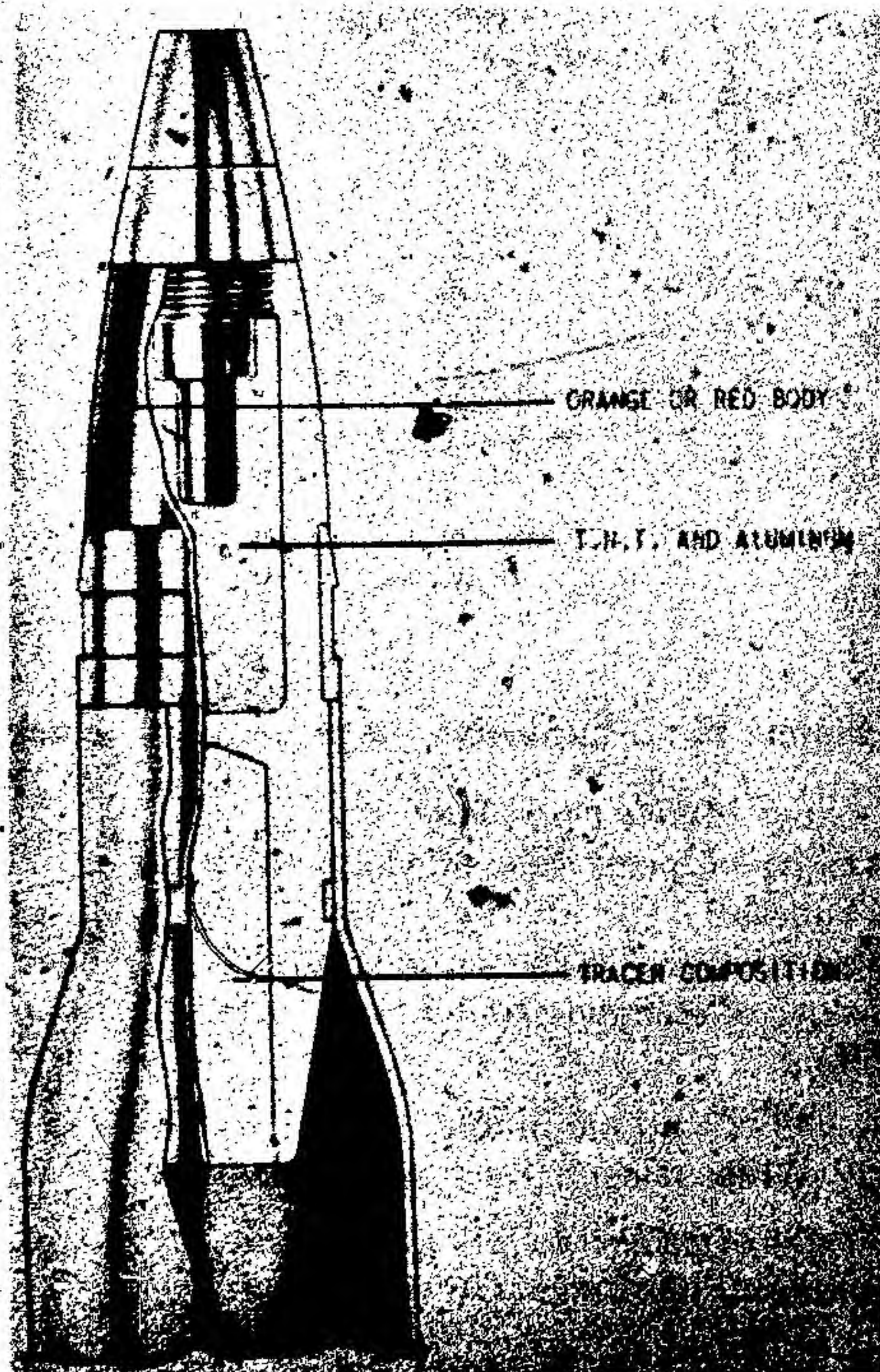


Figure 360—25-mm High-Explosive Tracer Projectile.

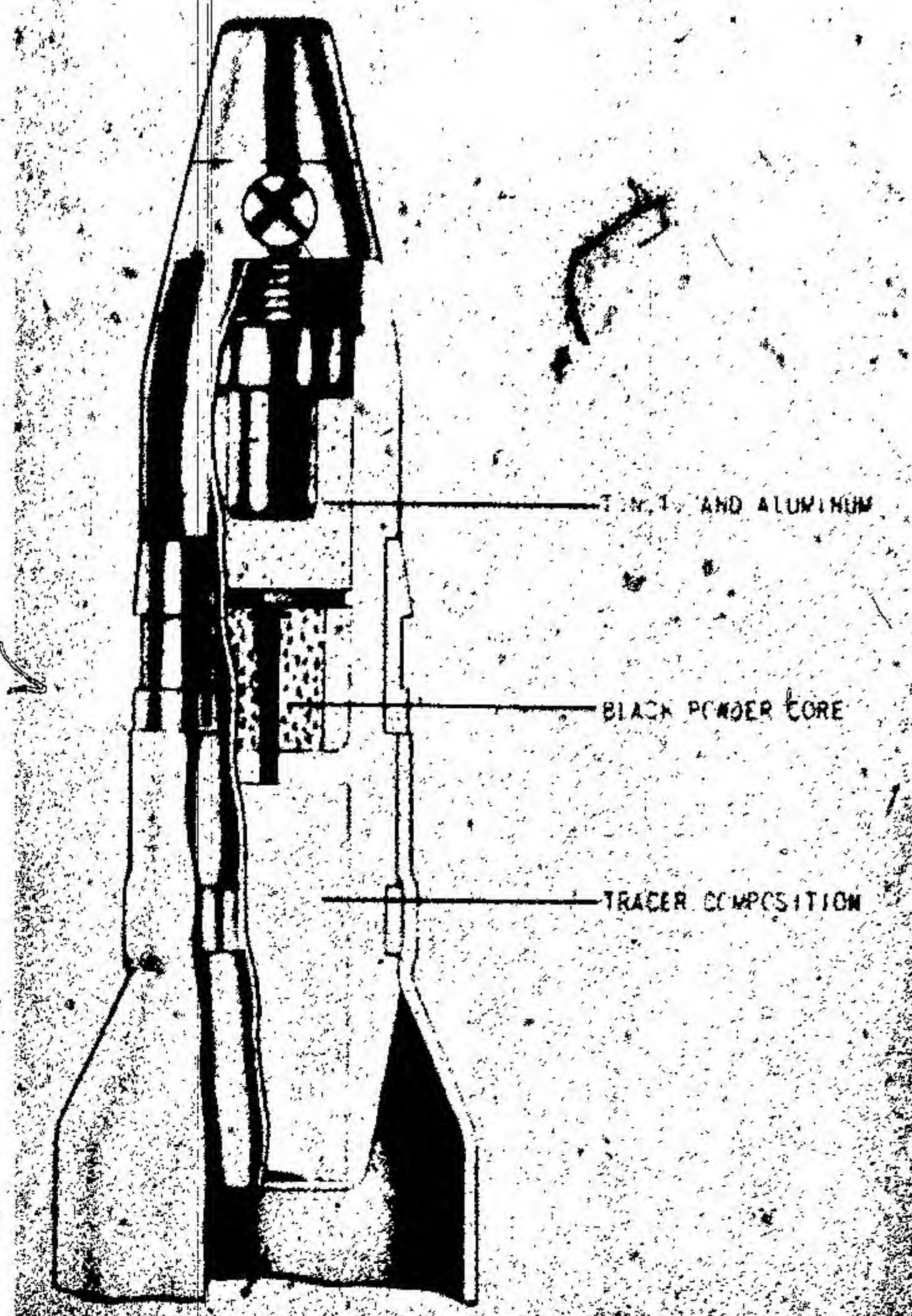


Figure 361—25-mm High-Explosive Tracer (Self-Destroying) Projectile.

25-mm High-Explosive Tracer (Self-Destroying) Projectile

Fuzing: Model 1 or Model 4.

Weight of projectile, filled (without fuze): 4.16 ounces.

Length of projectile (without fuze): 3.43 inches.

Length of complete round: 8.24 inches.

Filling: TNT and aluminum with a black powder core in the lower pellet.

Weight of projectile filling (including tracer): 0.72 ounce.

Color and markings: Red over all.

Remarks: There is no external marking to distinguish the self-destroying rounds from those that are not self-destroying.

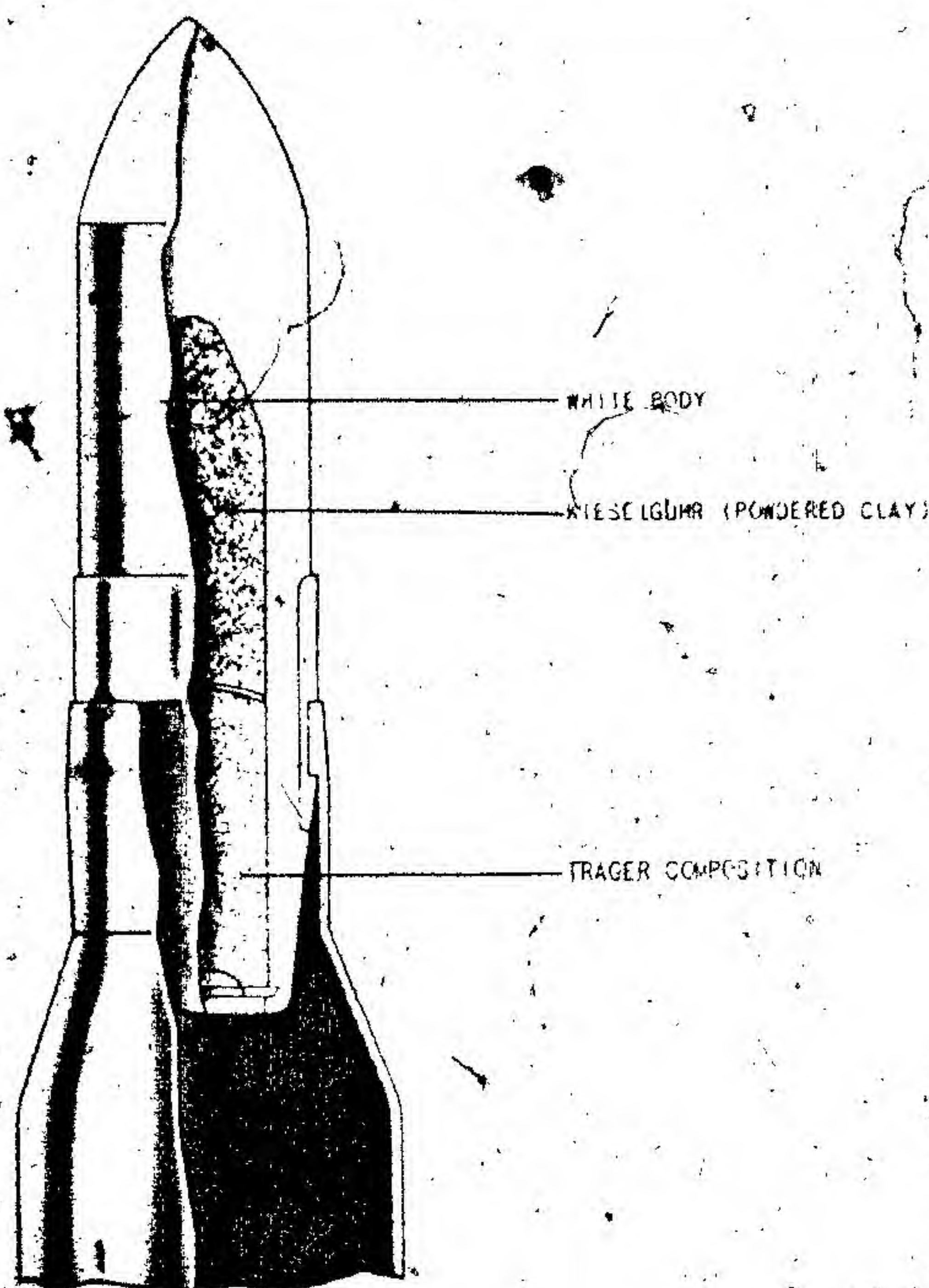


Figure 362—25-mm Armor-Piercing Projectile.

25-mm Armor-Piercing Projectile

Fuzing: None.

Weight of projectile, filled: 8.88 ounces.

Length of projectile: 3.93 inches.

Length of assembled round: 8.74 inches.

Filling:

Tracer: Sodium nitrate, magnesium and barium peroxide.

Inert material: Kieselguhr (chiefly dry clay).

Weight of projectile fillings:

Inert material: 1.25 ounces (3.53 grams).

Tracer: 3.05 ounces (8.64 grams).

Color and markings: Black, white, or smoky blue over all.

Remarks: This projectile is listed in Japanese documents as armor-piercing, although the metal is softer than that used in smaller A. P. rounds.

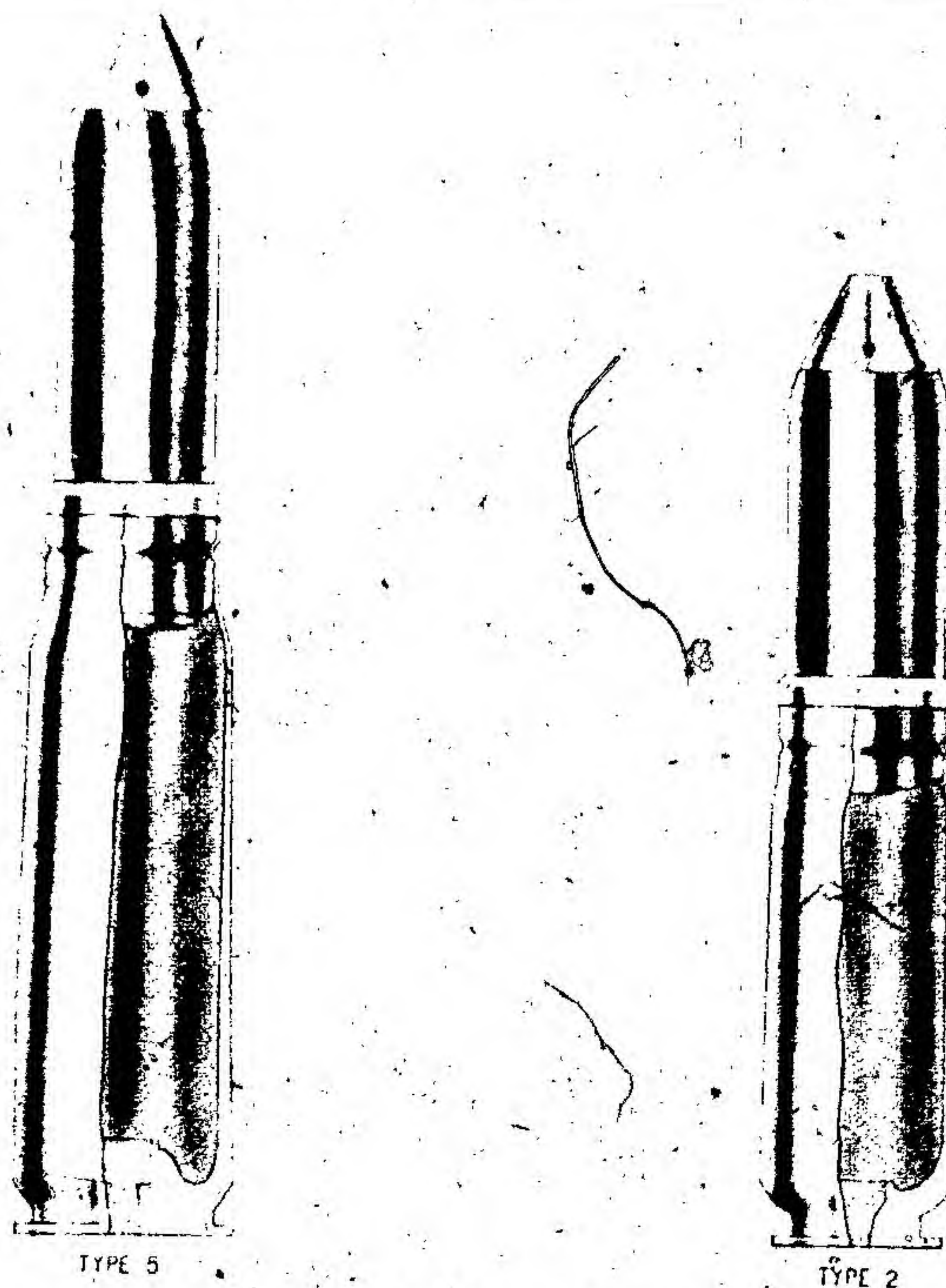


Figure 363—30-mm Ammunition.

30-mm Ammunition

Two 30-mm aircraft cannon, the type 2 and the type 5, were in use by the Japanese. These guns are of Oerlikon design and use similar ammunition. The type 5 gun uses a longer case and a slightly heavier projectile than the type 2 gun.

Case: The case for the type 2 gun is of typical Oerlikon design. It is a comparatively short brass reduced-rim case slightly necked.

The case for the type 5 gun is longer, has a more pronounced neck, and is of the rimless type.

	Type 2	Type 5
Length of case	3.58 inches	4.81 inches

Projectiles: Like the 20-mm ammunition, the type of projectile is indicated by painting the

projectile body a solid color. However, some of the type 5 projectiles were unpainted except for a narrow band behind the nose fuze.

The following dimensions are common to all projectiles:

	Type 2	Type 5
Diameter at bourrelet	1.18 inches	1.18 inches
Width of rotating band	0.24 inch	0.31 inch

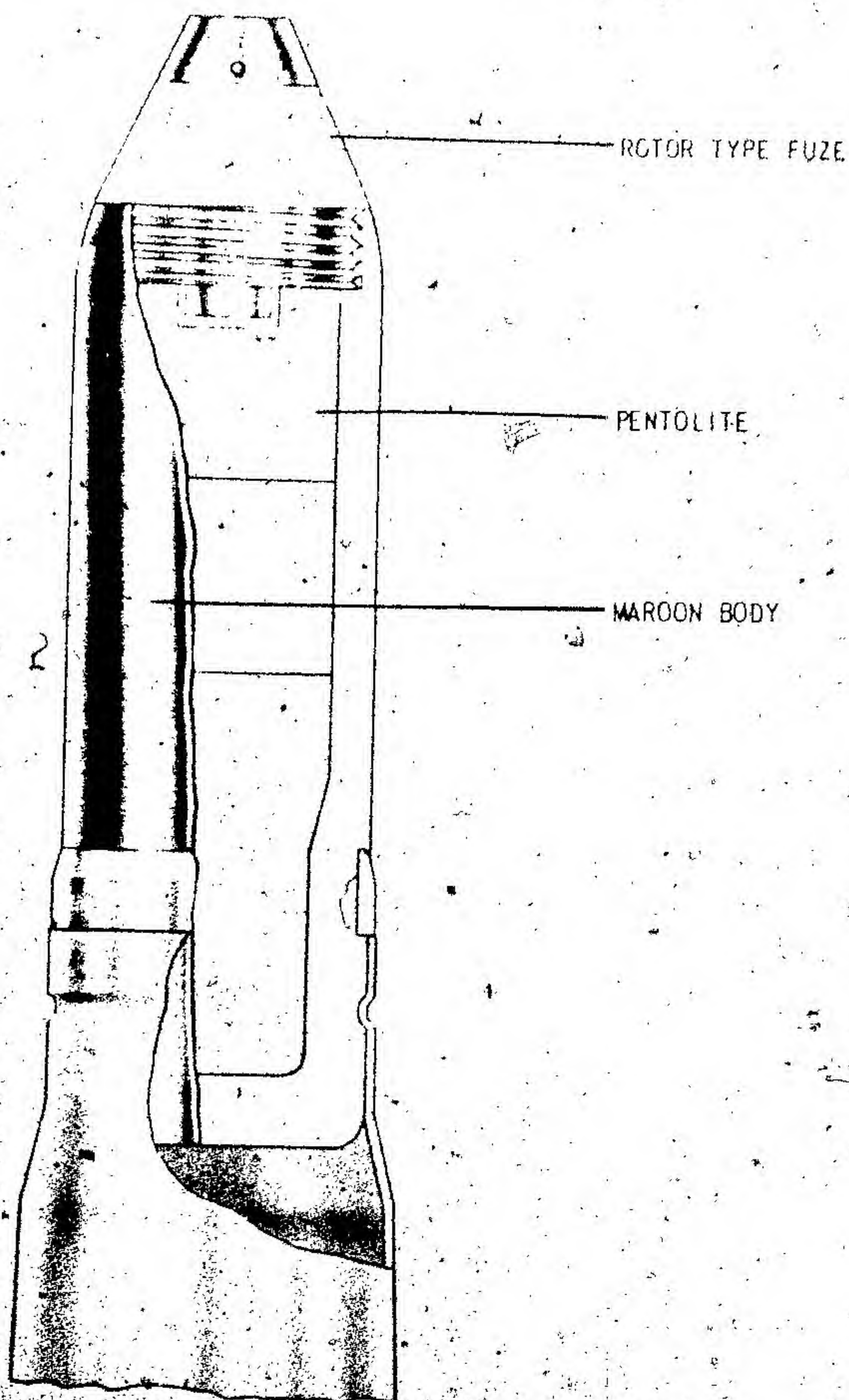


Figure 364—30-mm Type 5 High-Explosive Projectile.

30-mm Type 5 High-Explosive Projectile

Fuzing: Rotor type fuze.

Length of projectile (without fuze): 3.53 inches.

Length of complete round: 8.31 inches.

Filling: Pentolite.

Color and markings: Maroon over all.

Remarks: The pentolite is in a precast block surrounded by cardboard.

JAPANESE EXPLOSIVE ORDNANCE

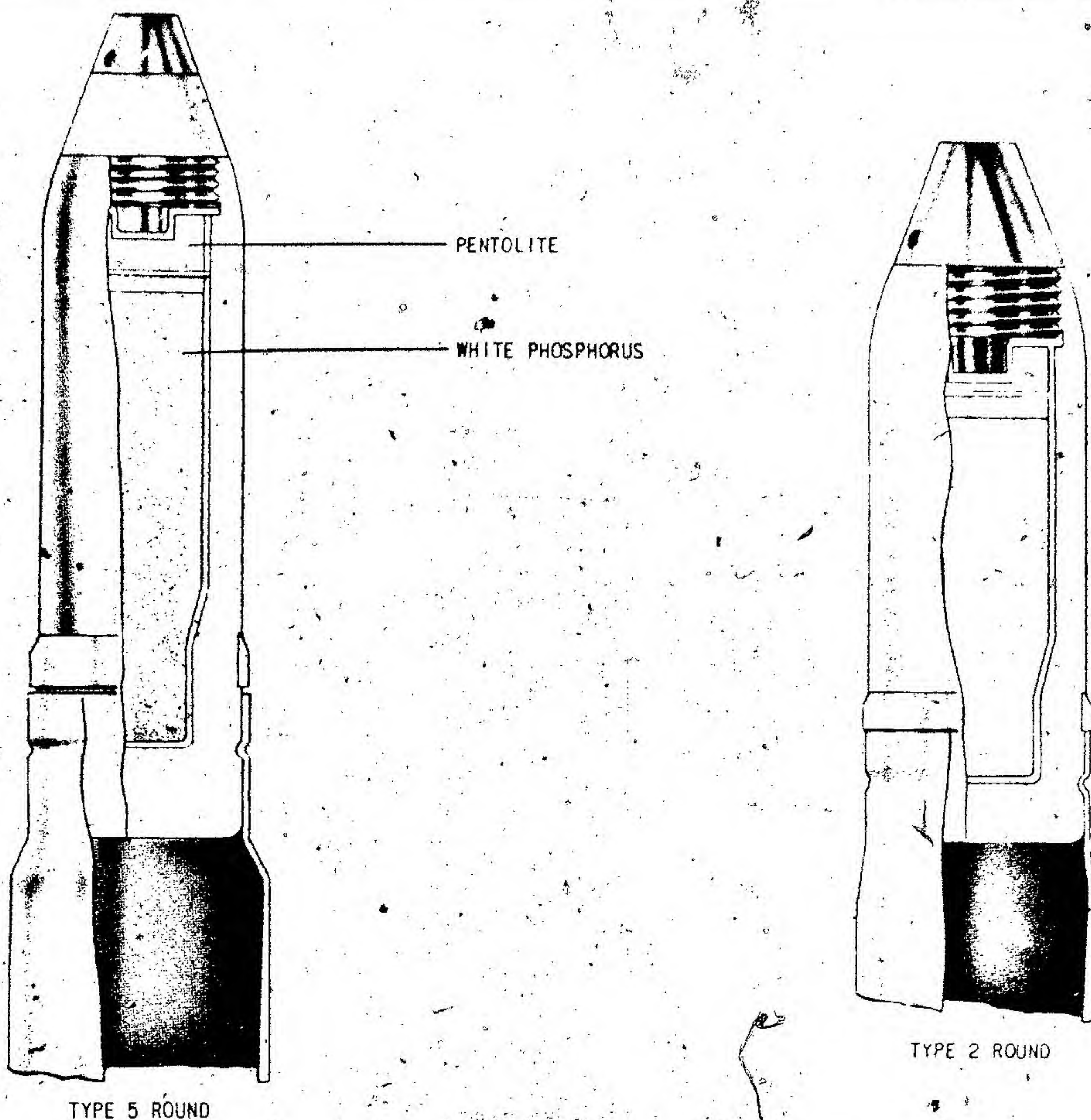


Figure 365—Type 2 and Type 5 30-mm High-Explosive Incendiary Projectile.

30-mm Type 2 and Type 5 High-Explosive Incendiary Projectiles

Fuzing: Rotor type fuze.

Length of projectile, **Type 2** **Type 5**
(without fuze)..... 2.83 inches. 3.53 inches.

Length of assembled
round (fuzed)..... 6.57 inches. 8.31 inches.

Weight of filling (type 2):

Pentolite: 3.56 grams.

White phosphorus: 19.94 grams.

Filling: Pentolite and white phosphorus.

Color and markings: Greenish-yellow over all.

The type 5 projectile is sometimes unpainted except for a greenish-yellow band at the nose.

Remarks: The one-piece projectile contains only one cavity. The H. E. is surrounded by a cardboard below which is contained the W. P. in a metal canister.

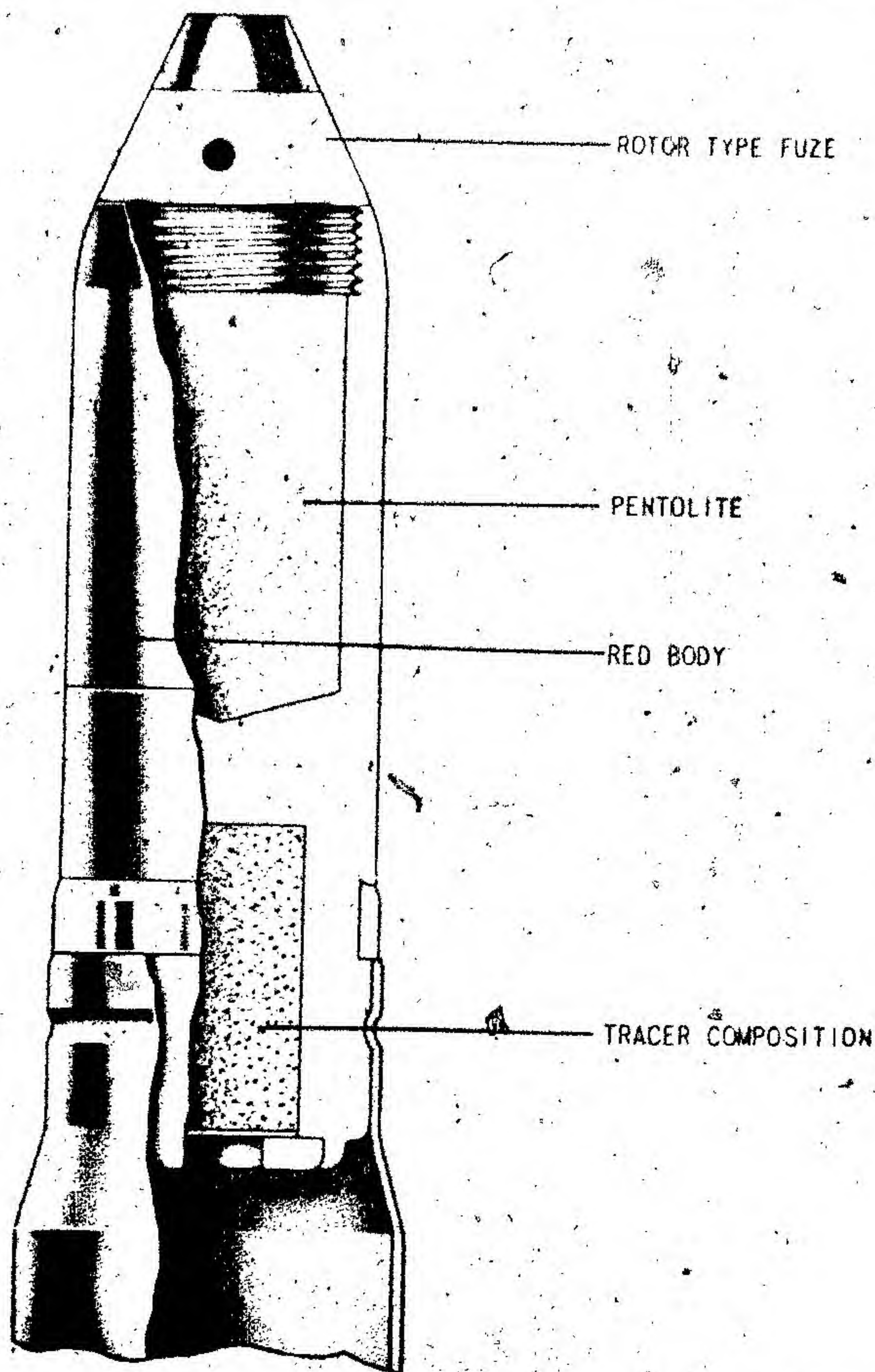


Figure 366—Type 5 30-mm High-Explosive Tracer Projectile.

Type 5 30-mm High-Explosive Tracer Projectile

Fuzing: Rotor type fuze.

Length of projectile (without fuze): 3.53 inches.

Length of complete round: 8.31 inches.

Filling: Pentolite.

Color and markings: Red over all or a red band at the nose.

Remarks: The body of the projectile contains two cavities separated by a steel septum. The upper cavity contains the H. E. filling, while the lower contains the tracer.

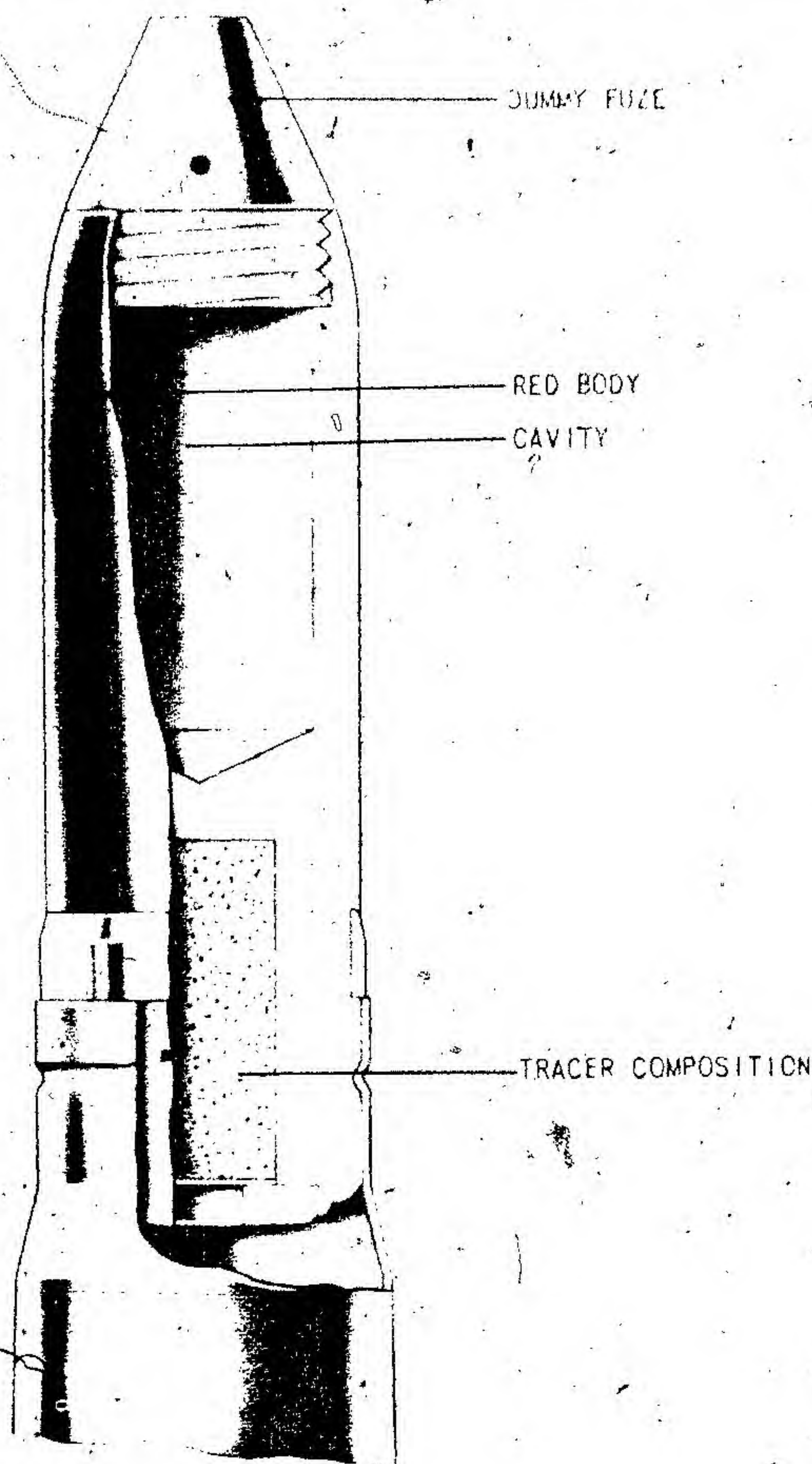


Figure 367—Type 5 30-mm Tracer Projectile.

Type 5 30-mm Tracer Projectile

Fuzing: Nose plug.

Length of projectile (without fuze): 3.53 inches.

Length of complete round: 8.31 inches.

Filling: None.

Color and markings: Red over all or a red band at the nose.

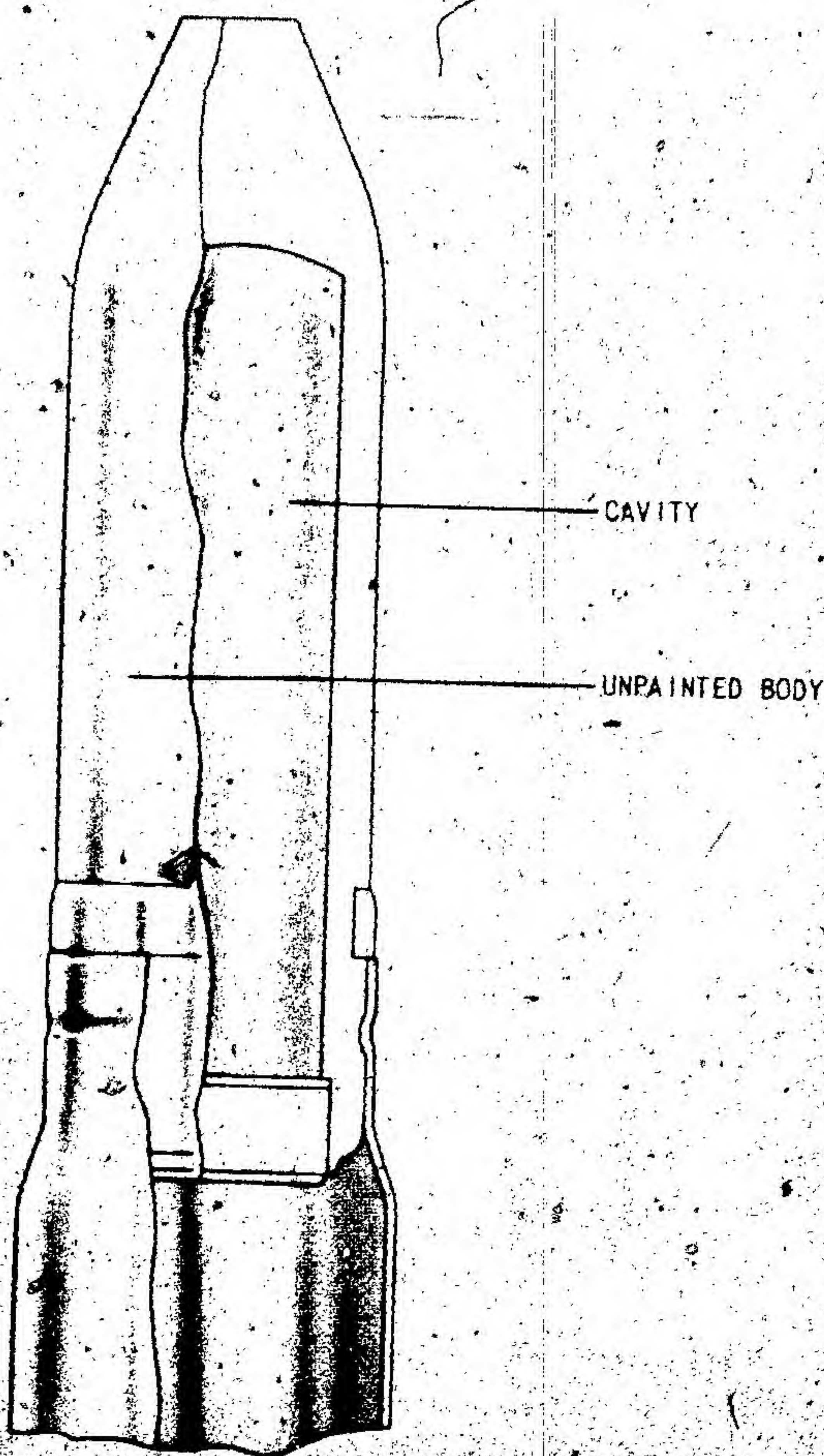


Figure 368—Type 2 and Type 5 30-mm Practice Projectile.

Type 2 and Type 5 30-mm Practice Projectiles

Fuzing: Dummy fuze.

Length of projectile	Type 2	Type 5
(without fuze).....	2.83 inches	3.53 inches

Length of assembled	Type 2	Type 5
round (fuzed).....	6.57 inches	8.28 inches

Filling: Blind loaded.

Color and markings:

Type 2: Black over all with red dummy fuze.
Type 5: Not painted.

Remarks: The projectile body and case are the same in appearance as the H. E. I. round.

This is used as the first round in the magazine, clear the gun bore.

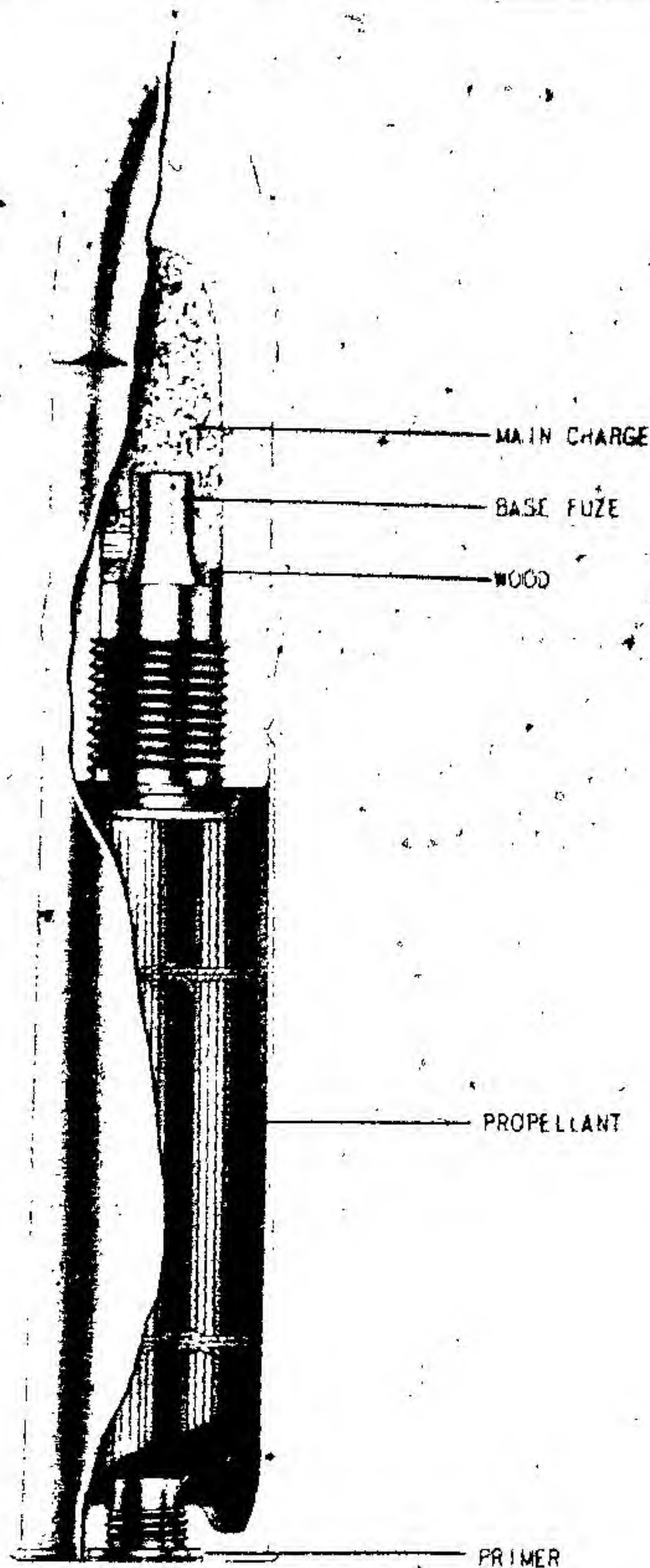


Figure 369—40-mm Armor-Piercing Projectile.

40-mm Armor-Piercing Projectile

Weight of complete round (without fuze): 1.17 kg. (2.57 pounds).

Weight of projectile, filled (without fuze): 0.78 kg. (1.82 pounds).

Weight of filling: 0.023 kg.

Filling: Cast TNT.

Diameter at bourrelet: 1.57 inches.

Length of projectile (without fuze): 5.24 inches.

Length of assembled round: 10.33 inches.

Length of propellant case: 6.18 inches.

Width of rotating band: 0.63 inch.

Diameter of base of propellant case: 1.89 inches.

Fuzing: Small A/P base fuze.

Propellant: Cylindrical lengths of smokeless powder, 95.9 grams.

Color and markings: White, green tip.

Remarks: This round indicates use of the 40-mm Vickers-Armstrong as a dual-purpose gun.

40-mm High-Explosive Antiaircraft Projectile

Weight of complete round (without fuze): 1.18 kg.
(2.50 pounds).

Weight of projectile, filled, (without fuze): 0.79
kg. (1.74 pounds).

Weight of filling of projectile: 0.07 kg.

Filling: Cast TNT.

Diameter at bourrelet: 1.57 inches.

Length of projectile (without fuze): 5.01 inches.

Length of assembled round (without fuze): 10.40
inches.

Length of propellant case: 6.18 inches.

Width of rotating band: 0.63 inch.

Diameter of base of propellant case: 1.89 inches.

Fuzing: A. A. powder time fuze.

Propellant: Cylindrical lengths of smokeless powder, 95.9 grams.

Color and markings: Maroon with 12-mm green
band around ogive.

Remarks: This round was evidently designed
only for antiaircraft work, having no impact or
tracer element. It is used in the Navy's Vickers-
Armstrong guns, which are belt-fed with automatic
fuze cutters attached.

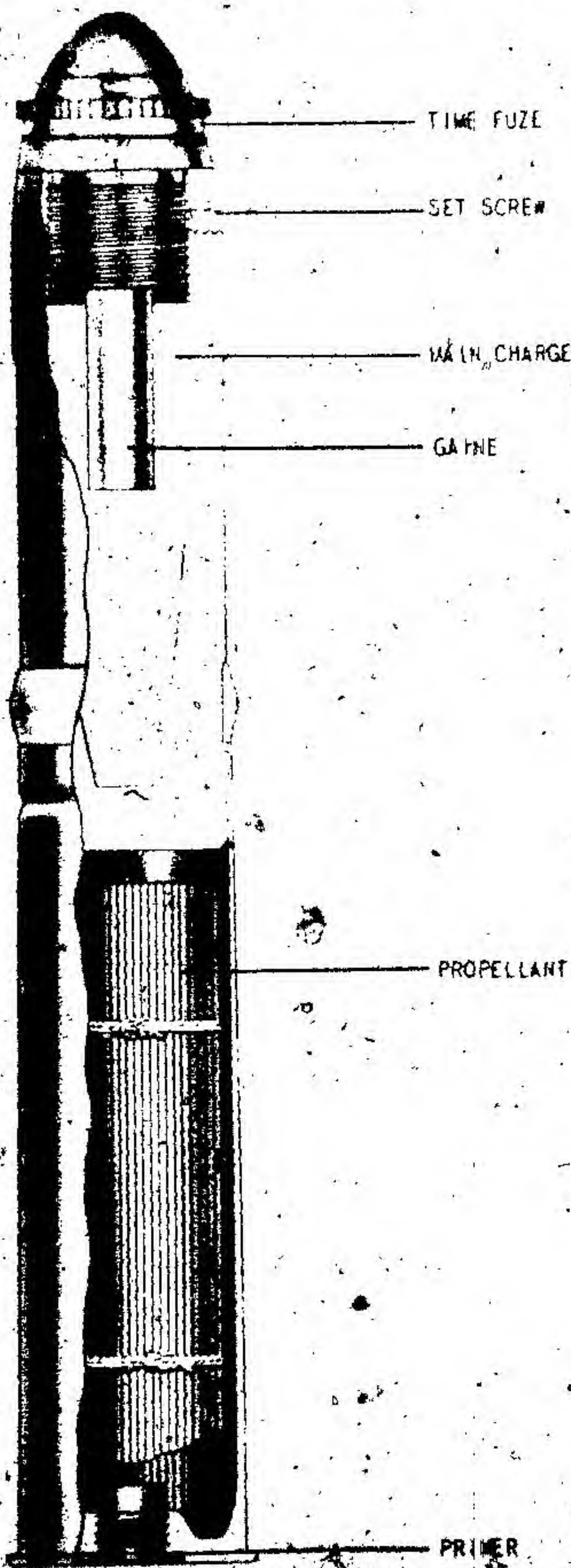


Figure 370—40-mm High-Explosive Antiaircraft Projectile.

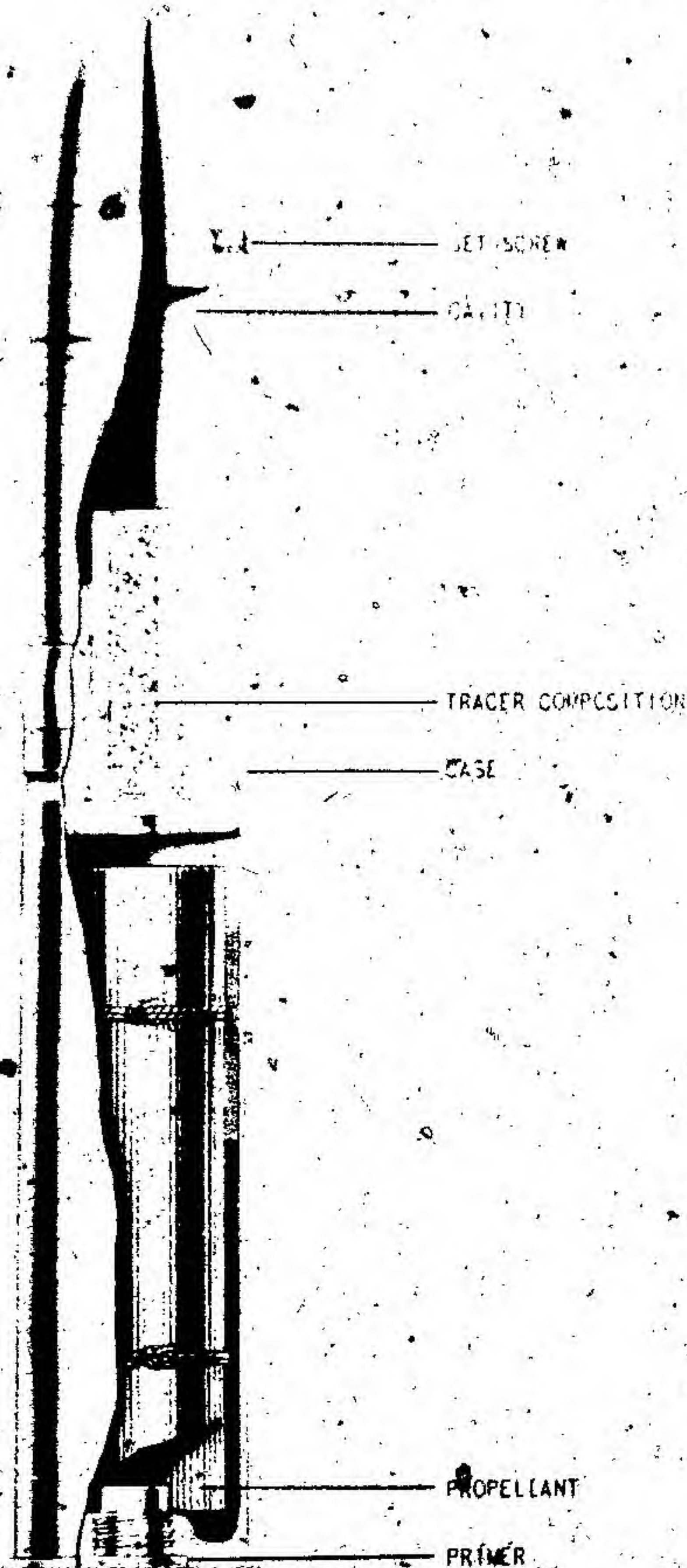


Figure 371—40-mm Tracer Projectile.

40-mm Tracer Projectile

Weight of complete round (with nose cap): 1.28 kg.

Weight of projectile (with tracer and nose cap): 0.90 kg.

Weight of tracer with charge: 0.07 kg.

Filling: None.

Diameter at bourrelet: 1.57 inches.

Length of projectile (with nose cap): 6.61 inches.

Length of assembled round (with nose cap): 11.30 inches.

Length of propellant case: 6.18 inches.

Width of rotating band: 0.63 inch.

Diameter of base of propellant case: 1.89 inches.

Fuzing: None.

Propellant: Cylindrical lengths of smokeless powder, 95.9 grams.

Color and marking: Orange over all.

Remarks: This round is similar in shape to the A. A. type. The nose, of solid construction with two large wrench flats, screws into the projectile body just before of the bourrelet, with right-hand threads. The inside is lacquered. The tracer element is screwed into the base with left-hand threads.

It is used in the Vickers-Armstrong guns.

5-cm (47-mm) Complete Round and Common Projectile

Assembled round:

Weight of complete round: 3.2 pounds.

Length of complete round: 9.25 inches.

Projectile:

Weight of filled projectile (with fuze): 2.4 pounds.

Weight of projectile (empty): 2.1 pounds.

Dimensions:

Length of projectile (without fuze): 5.31 inches.

Diameter at bourrelet: 1.84 inches (46.7-mm).

Distance from base to rotating band: 1.25 inches.

Width of rotating band: 1.69 inches.

Filling: Loose granular black powder: 1.8 ounces (50 grams).

Fuzing: Hotchkiss patent fuze, screwed (R. H.) into base; a simple setback arming base fuze, presumably of British manufacture. The base of the fuze is stamped "Hotchkiss Patent DOC." Weight of fuze, 2 ounces.

Case:

Length: 5.19 inches.

Diameter at base: 2.38 inches.

Material: Brass (recovered); steel (documentary).

Weight (empty): No data.

The case is crimped into a groove in the base of the projectile by several short crimps.

Propellant: 5 C2 (type 2-year propellant) 2.4 ounces (0.067 kg.).

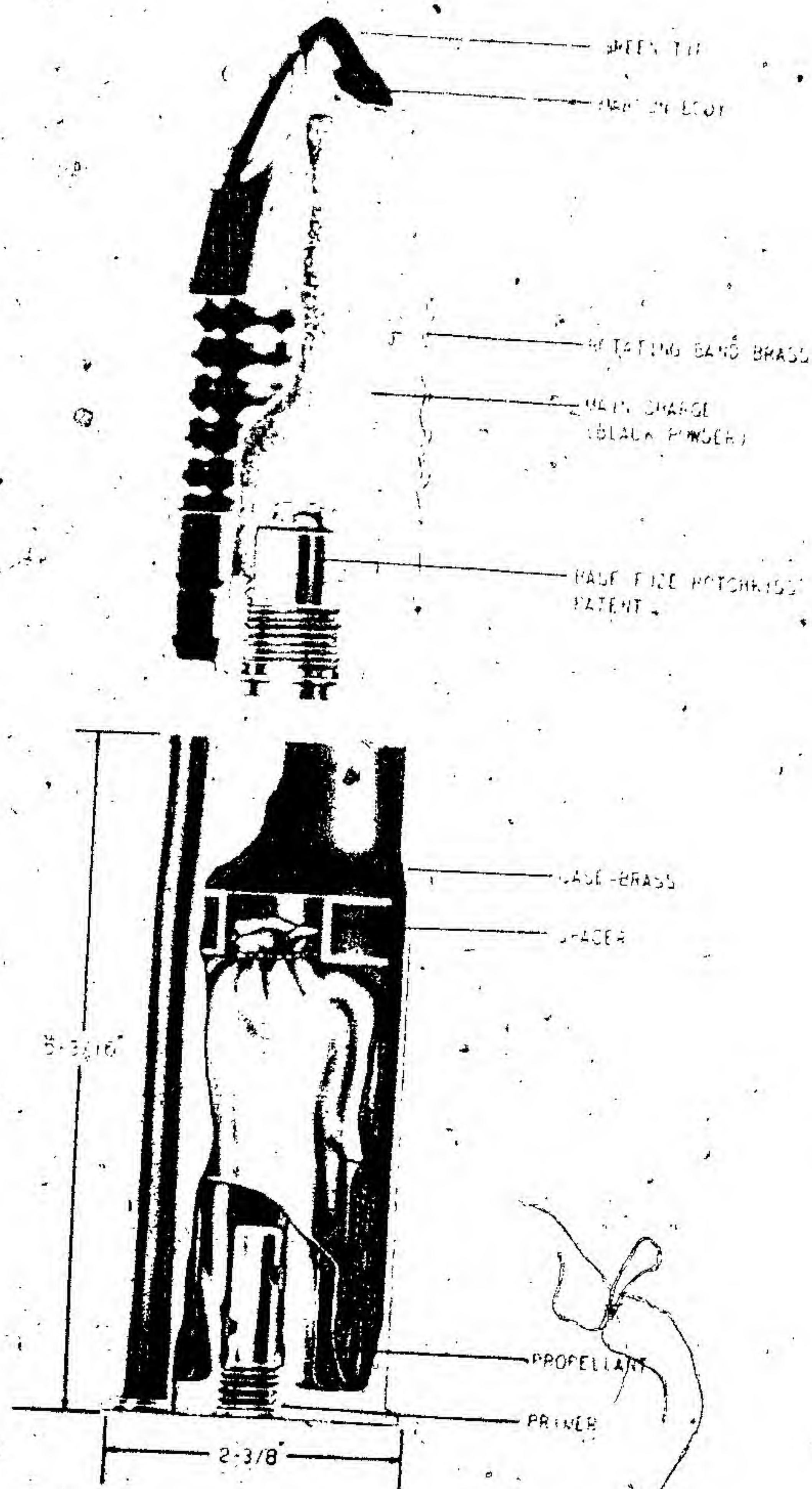


Figure 372—5-cm Complete Round and Common Projectile.

Unperforated Cylindrical sticks, approximately 0.5 mm ($\frac{1}{4}$ — $\frac{1}{2}$ inch) by $3\frac{3}{16}$ inches amber-colored double-base powder.

The propellant sticks are enclosed in a compartmented bag of heavy brownish silk.

Primer: Small flush type (designation unknown).

Weapon in which used: Short 5-cm gun.

This gun, mounted on wooden-spoked wheels as a field piece, corresponds to old

U. S. "landing guns" and is probably a copy of an obsolete British gun. The breech block is the vertical sliding type.

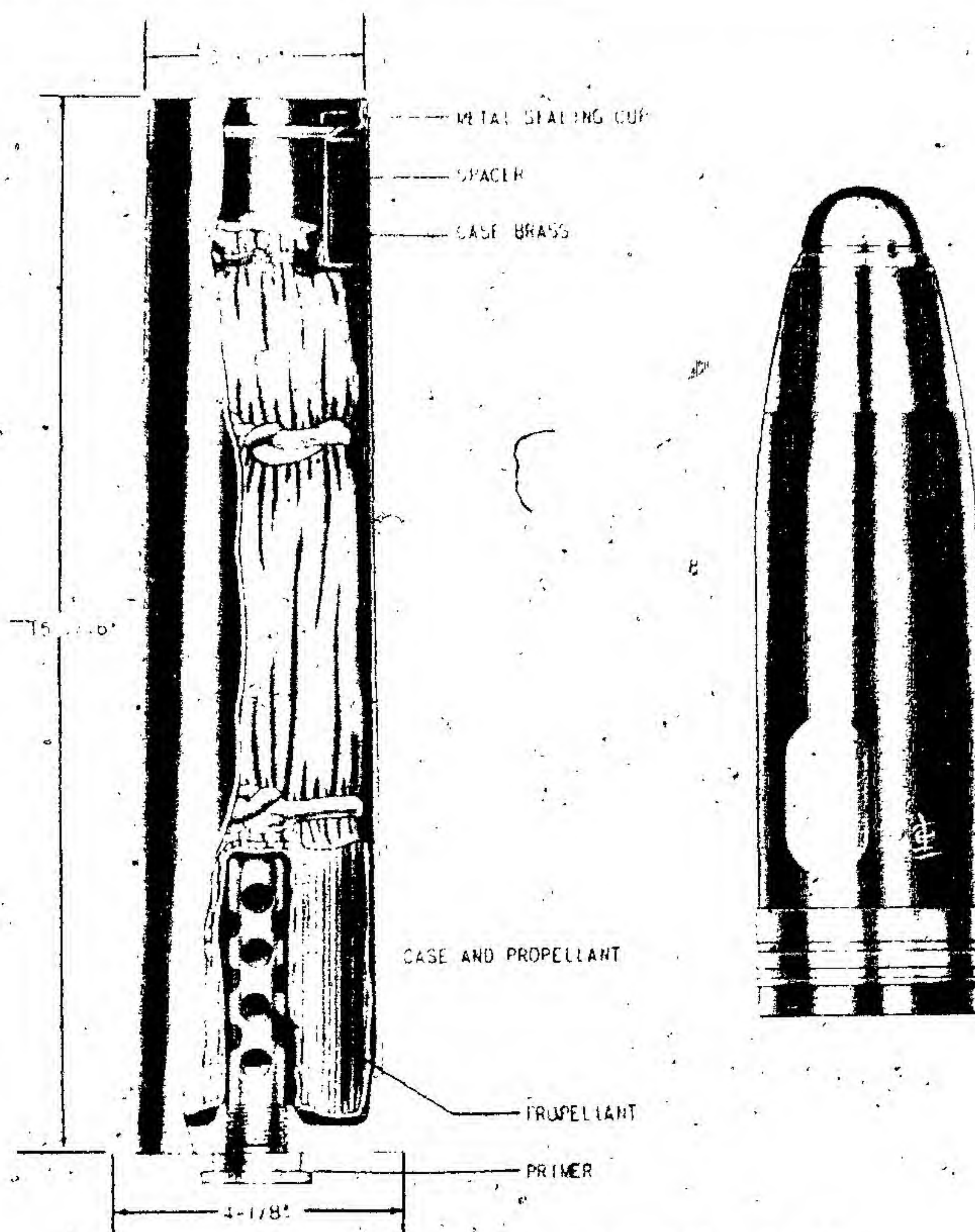


Figure 373—8-cm Complete Round (Semifixed).

8-cm (76.2-mm) (3-Inch) Complete Round (Semifixed)

Case:

Length: 15.06 inches.

Diameter at base: 4.13 inches.

Material: Brass (recovered); steel (documentary).

Weight (empty): 4.97 pounds.

Propellant:

20 3C (type 89 propellant) 1.98 pounds (0.900 kg.).

Unperforated cylindrical sticks, approximately 2-mm ($\frac{1}{16}$ — $\frac{1}{8}$ inch) by 12.75 inches, amber-colored double-base powder.

The propellant sticks are enclosed in a bag of heavy brownish silk.

Primer: Mk 1 case percussion primer, Model 4.

Weapon in which used: "AN" (Armstrong) type 8-cm/40 gun (low angle).

Except for minor changes, this is an exact copy of a British naval gun, and guns of both British and Japanese manufacture have been found ashore in Japanese emplacements for coastal defense.

The gun is pedestal-mounted. The breech is closed by a two-step interrupted-thread block.

8-cm (76.2-mm) (3-Inch) (Ordinary Mk 2 Mod 2) High-Explosive Projectile

Weight of filled projectile (without fuze): 11.46 pounds.

Weight of projectile (empty): 10.75 pounds.

Weight stamped on rotating band (sample): 4.860 kg. (varies with individual projectiles).

Length of projectile (without fuze): 9.49 inches.

Diameter at bourrelet: 3.0 inches.

Distance from base to rotating band: 0.44 inch.

Width of rotating band: 1.0 inch.

Radius of ogive: 6 cal.

Filling: Cast picric acid (shimose): .71 pound.

The charge consists of a single block of explosive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 5-year point detonating fuze.

Weapon in which used: "AN" (Armstrong) type 8-cm/40 gun (low angle).

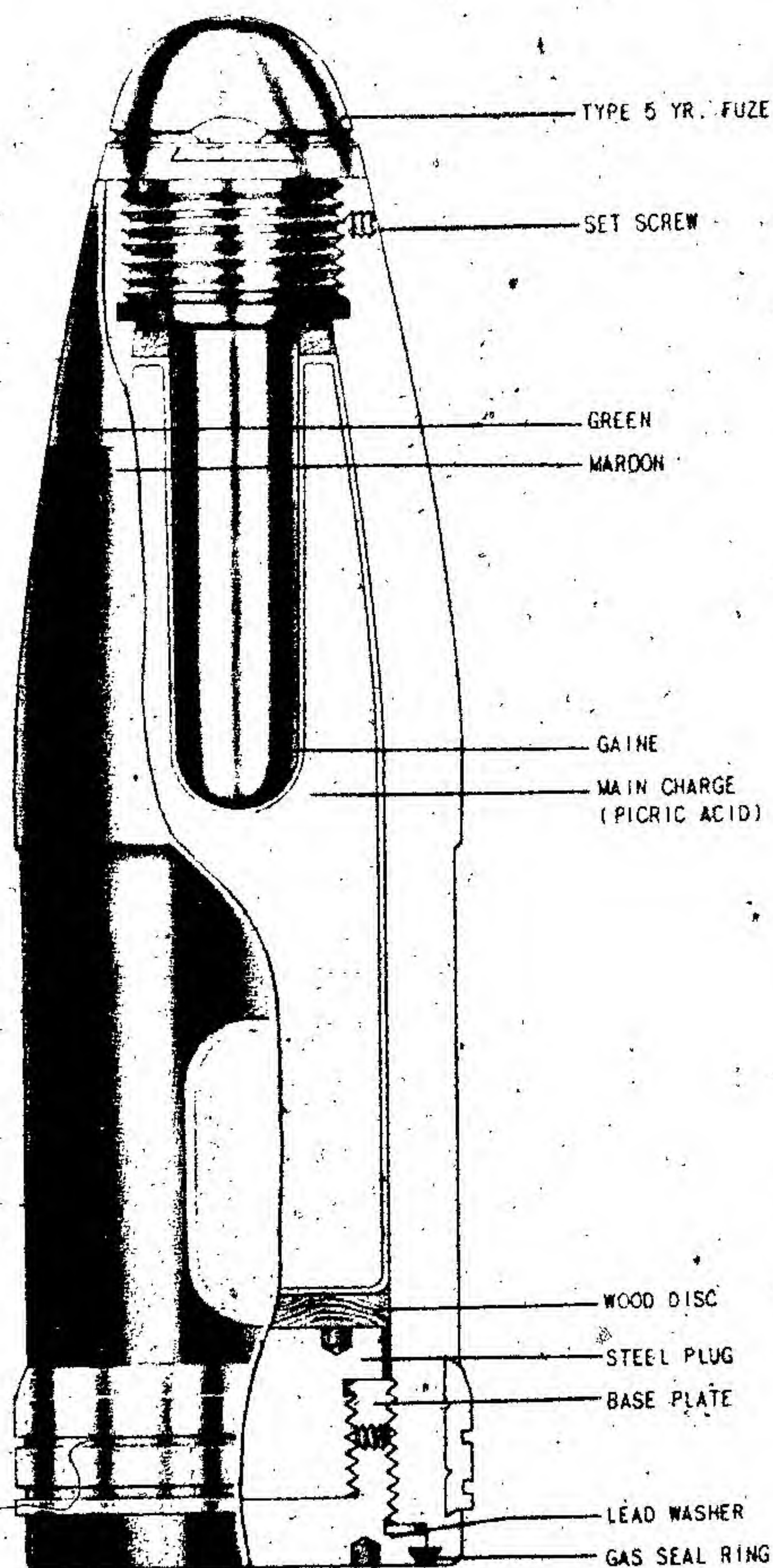


Figure 374—8-cm (Ordinary Mk 2 Mod 2) High-Explosive.

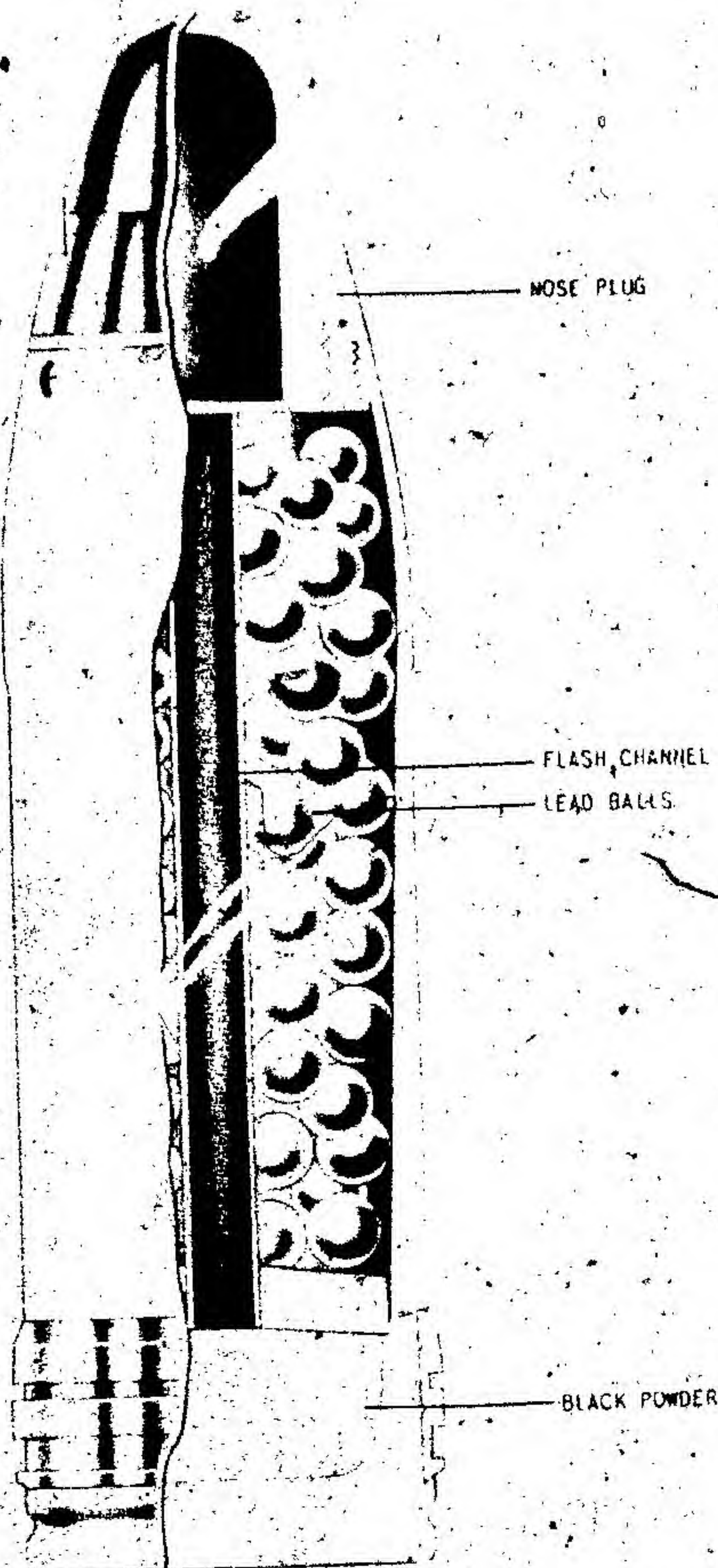


Figure 375—8-cm Shrapnel.

8-cm (76.2-mm) (3-Inch) Shrapnel Projectile

*Assembled round:

Weight of complete round (without fuze): 19 pounds.

Length of complete round (without fuze): 23.75 inches.

Projectile:

Weight of filled projectile (without fuze): 10.8 pounds.

Weight of projectile (empty): No data.

Weight stamped on rotating band (sample): 2.86 kg. (Varies with individual projectiles).

Dimensions:

Length of projectile (without fuze): 8.38 inches.

Diameter at bourrelet: 2.97 inches (75.5-mm).

Distance from base to rotating band: 0.75 inch.

Width of rotating band: 1.0 inch.

Radius of ogive: 4 cal.

Filling: Black powder and shrapnel balls.

Fuzing: 30-second time fuze.

Weapons in which used:

Type 3-year 8-cm/40 dual-purpose gun.

Type 88 8-cm/40 dual-purpose gun.

Type 98 8-cm/60 dual-purpose gun.

8-cm (76.2-mm) (3-Inch) Complete Round (Fixed)

Case:

Length: 16.06 inches.

Diameter of base: 4.13 inches.

Material: Brass.

Weight (empty): 6.25 pounds.

The case is crimped tightly into a groove in the base of the projectile by a single continuous crimp.

Propellant:

20 C3 (type 89 propellant): 2.039 pounds (0.927 kg.).

Unperforated cylindrical sticks, approximately 2 mm (0.078 inch) by 12 $\frac{3}{4}$ inches, amber-colored double-base powder.

The propellant sticks are enclosed in a bag of heavy brownish silk. Primer Mk 2 case percussion primer, Model 4.

Weapons in which used: Type 88 8-cm/40 dual-purpose gun; 8-cm/40 type 3-year dual-purpose gun.

The latter gun is a pedestal-mounted gun with a breech block sliding diagonally down to the right. Although designed as a ship-board mount, it is commonly found mounted in fixed emplacements ashore for antiaircraft and coastal defense.

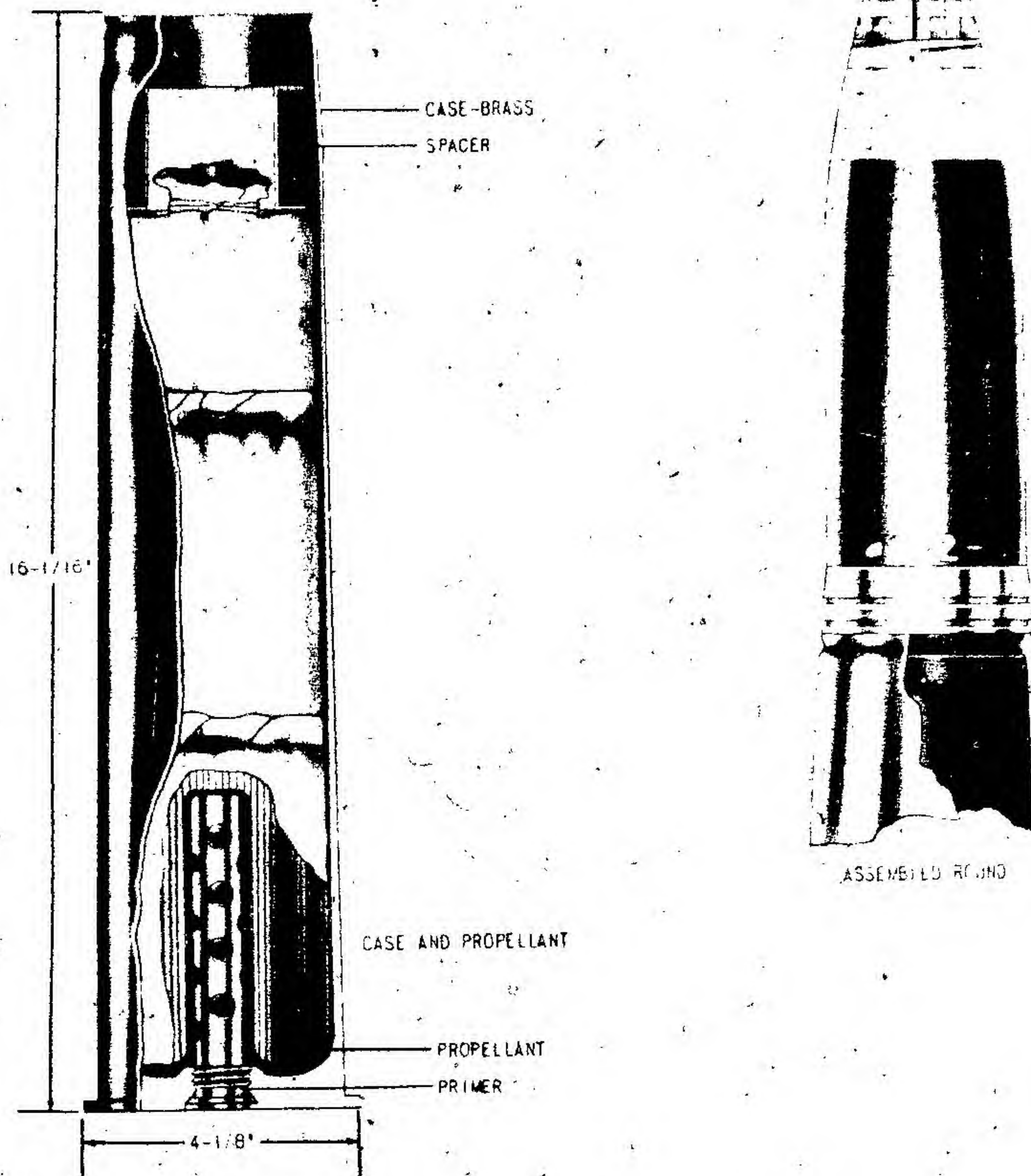


Figure 376—8-cm Complete Round (Fixed).

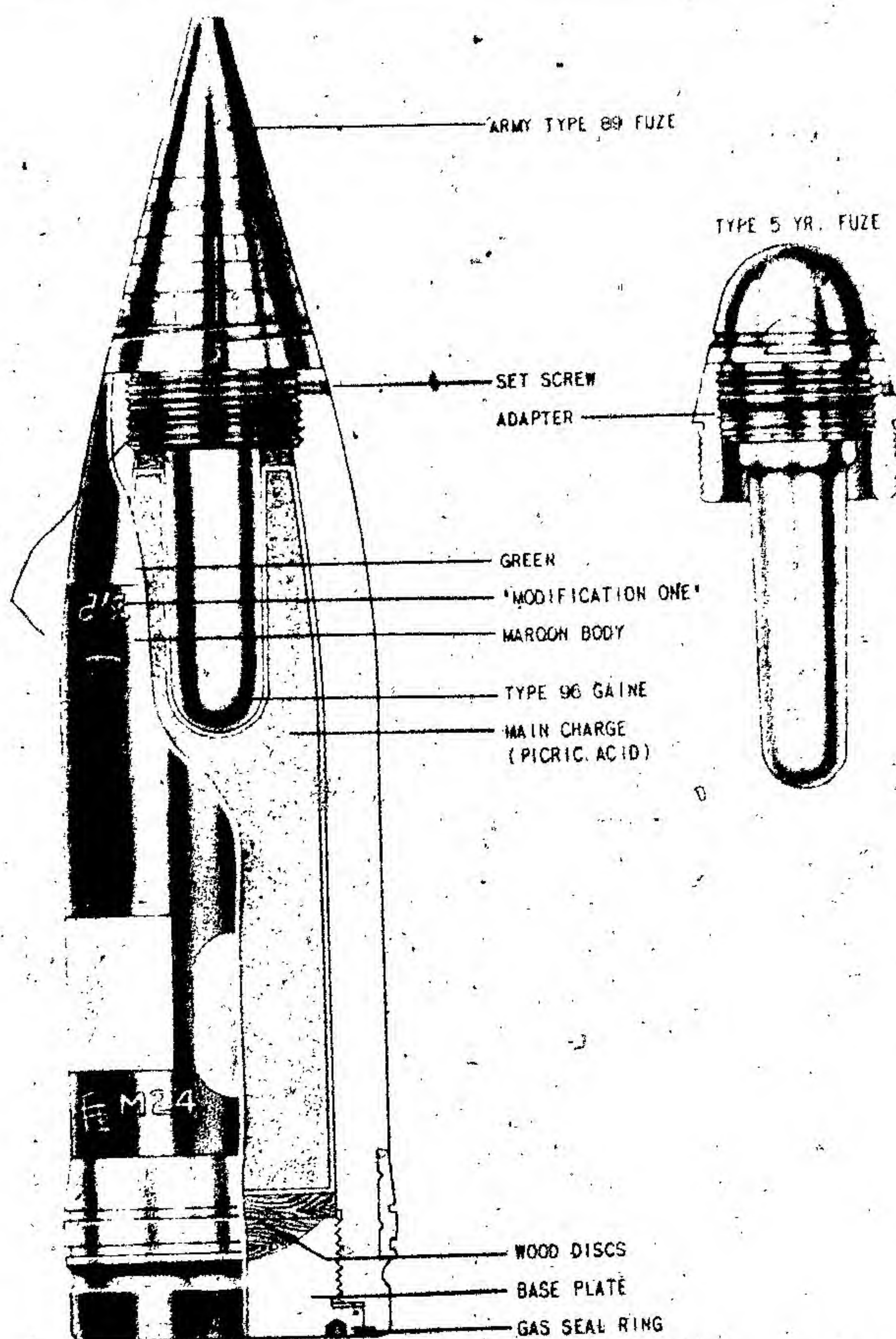


Figure 377—8-cm (Ordinary Mk 3 Mod 1) High-Explosive.

8-cm (76.2-mm) (3-Inch) (Ordinary Mk 3 Mod 1) High-Explosive

Assembled Round:

Weight of complete round: 19.25 pounds.

Length of complete round, with type 89 fuze:
28.25 inches.

Projectile:

Weight of filled projectile (without fuze):

9.5 pounds.

Weight, empty: 8.6 pounds.

Weight stamped on rotating band (sample)
4.865 kg. (varies with individual projectiles).

Dimensions:

Length of projectile (without fuze or adapter):
9.25 inches.

Diameter at bourrelet: 2.97 inches (75.5-mm)

Distance from base to rotating band: 0.7
inch.

Width of rotating band: 1.0 inch.

Radius of ogive: 4 cal.

Filling: Cast picric acid (shimose): 0.9 pound.

The charge consists of a single block of explosive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Weapon in which used:

Type 3-year, 8-cm/40 dual purpose gun.
Type 88 8-cm/40 dual purpose gun.

Fuzing:

- Army type 89 powder time fuze (30 seconds).
- Type 5 yr. point detonating fuze (instantaneous) with adapter.

8-cm (76.2-mm) (3-Inch) (Armor-Piercing Type 1) Special Common

Assembled round:

Weight of complete round: 21.04 pounds.

Length of complete round: 25.31 inches.

Projectile:

Weight of filled projectile (with fuze): 12.70 pounds.

Weight, empty: 11.72 pounds.

Weight Stamped on Rotating Band (sample):
5.31 kg. (varies with individual projectiles).

Dimensions:

Length of projectile: 9.875 inches.

Diameter at bourrelet: 2.98 inches (76.0 mm).

Distance from base to rotating band: 0.75 inch.

Width of rotating band: 1.0 inch.

Radius of ogive: 4 cal.

Filling: Trinitroanisole (type 91 explosive): 0.41 pound.

The charge consists of a single block of explosive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 1 fuze.

Weapon in which used:

Type 3-year 8-cm/40 dual-purpose gun.

Type 88 8-cm/40 dual-purpose gun.

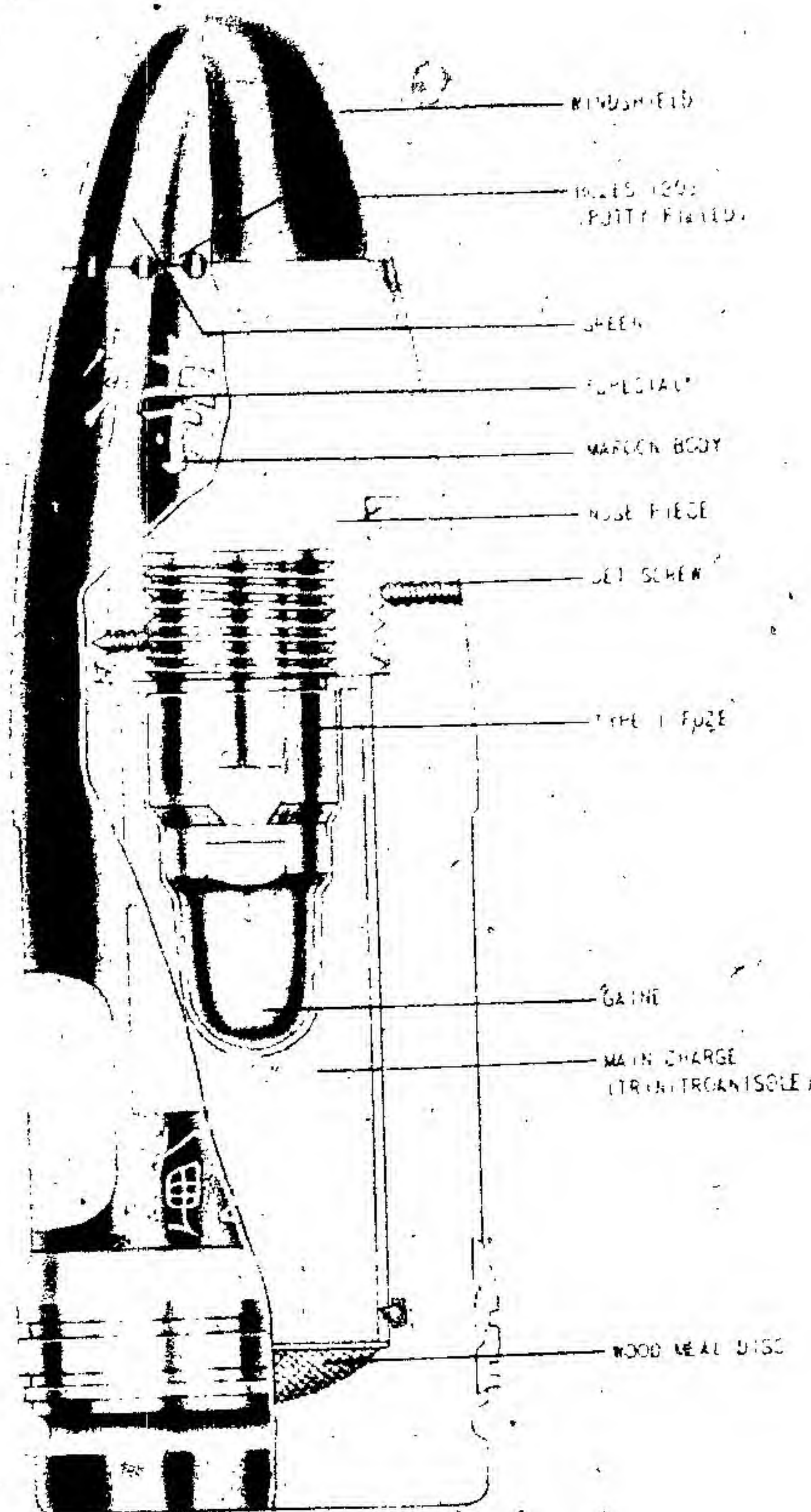


Figure 378—8-cm (Armor-Piercing Type 1) Special Common.

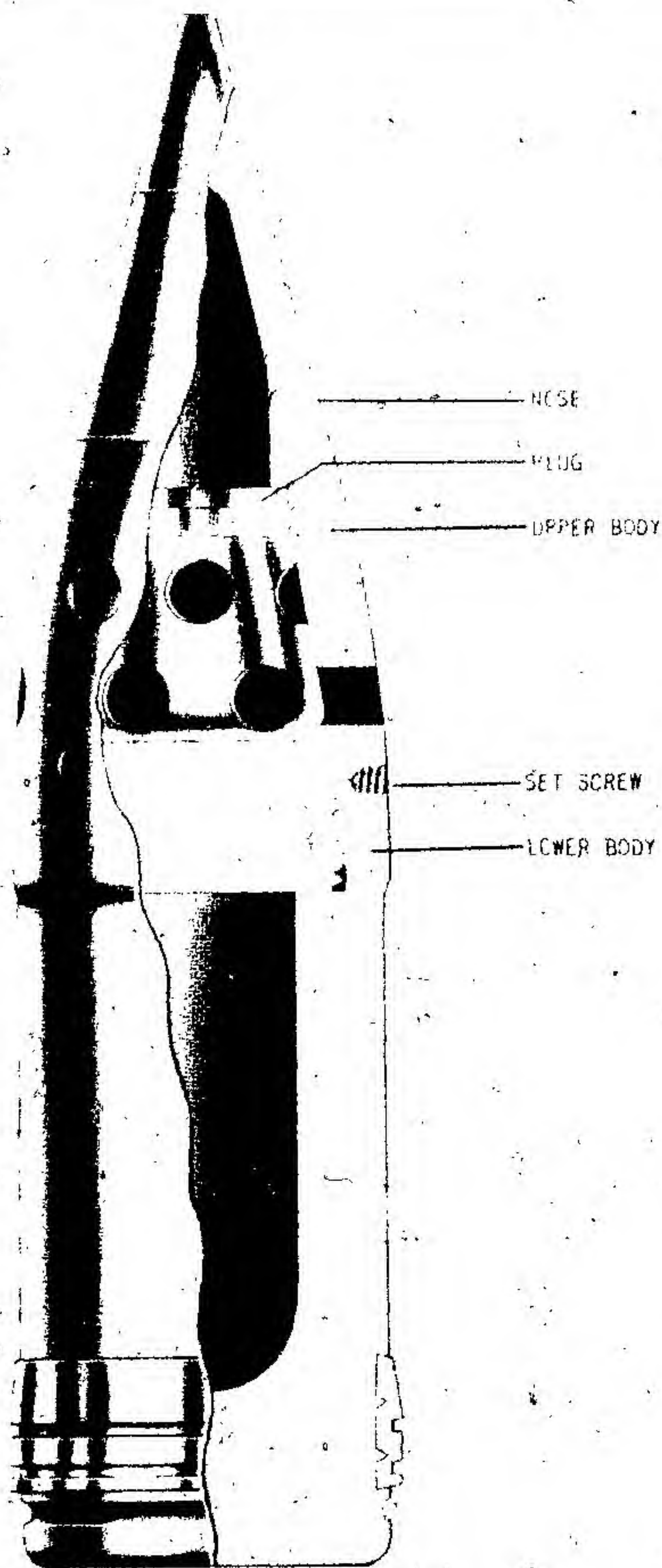


Figure 379—8-cm Time Practice.

8-cm (76.2-mm) (3-Inch) Time Practice Projectile

Assembled round:

Weight of complete round: No data.

Length of complete round: 28.06 inches.

Projectile:

Weight of filled projectile: No data.

Weight of projectile, empty: 12.30 pounds.

Weight stamped on rotating band (sample):
5.200 kg. (varies with individual projectiles).

Dimensions:

Length of projectile: 12.69 inches.

Diameter at bourrelet: 2.98 inches (76.0 mm).

Distance from base to rotating band: .69 inch.

Width of rotating band: 1.0 inch.

Radius of ogive: 4 cal.

Filling: No data. Possibly smoke compound or spotting dye.

Fuzing: Type 98 time fuze.

Weapon in which used:

Type 98 8-cm/60 dual-purpose gun.
8-cm short dual-purpose gun.

10-cm (100-mm) (3.9-inch) Complete Round (Fixed)

Case:

Length: 32.25 inches.

Diameter of base: 6.81 inches.

Material: Brass.

Weight (empty): No data.

The case is crimped tightly into a groove in the base of the projectile by a single continuous crimp.

Propellant: 20 D12 (type 93 Mk 2 propellant), 12.7 pounds (5.740 kg.).

Documentary evidence and relationship to other known propellants indicates that this propellant is a double base powder in the form of flat strips.

Primer: Mk 2 case percussion primer, Model 4.

Weapon in which used:

Type 98 10-cm/50 dual-purpose gun.

Type 98 10-cm/65 dual-purpose gun, twin.

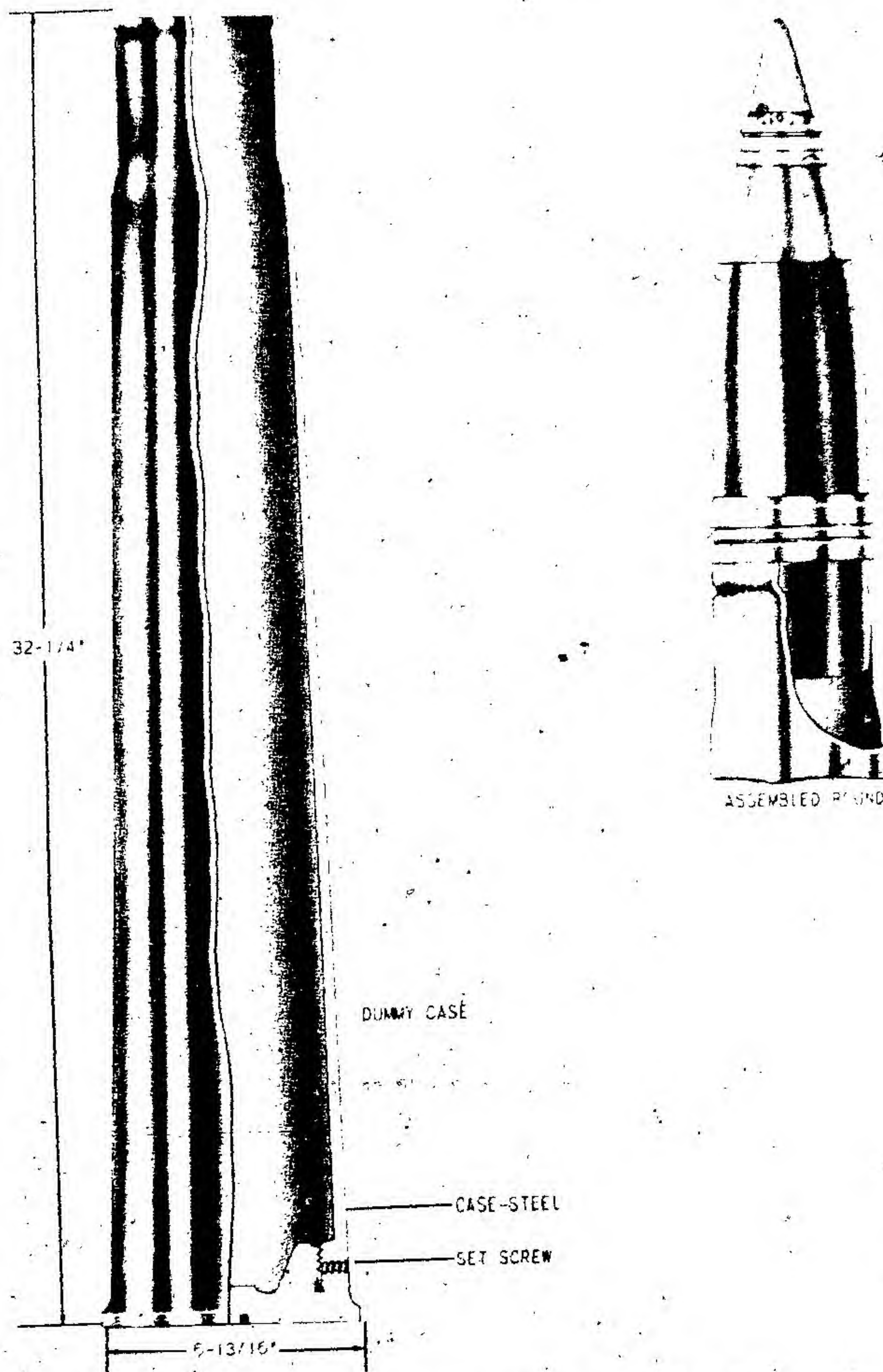


Figure 380—10-cm Complete Round (Fixed).

JAPANESE EXPLOSIVE ORDNANCE

The latter is a modern gun, paired in a twin power-driven mount designed especially for antiaircraft aboard ships. It has been found ashore, unaltered in the characteristic gun-house mount used aboard ship.

Special features of this gun and mount are horizontally opposed sliding breech blocks,

full power drive, and automatic fuze setting accomplished as the loading tray moves the round into position to be rammed. The arrangement for loading and fuze setting, and the general plan of the mount corresponds closely to that of the type 89 12.7-cm/40 twin mount.

10-cm (100-mm) (3.9-inch) High-Explosive Projectile

Assembled round:

Weight of complete round: 62.75 pounds.

Length of complete round, with type 98 fuze: 46.0 inches.

Projectile:

Weight of filled projectile (without fuze): 28.19 pounds.

Weight of projectile, empty: 25.06 pounds.

Weight stamped on rotating band (sample): 10.880 kg. (varies with individual projectiles).

Length of projectile (without fuze): 12.63 inches.

Diameter at bourrelet: 3.94 inches (99 mm).

Distance from base to rotating band: 2.69 inches.

Width of rotating band: 1.75 inches.

Radius of ogive: No data.

Filling:

TNT (type 92 explosive): 3.13 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing:

Type 98 mechanical time fuze (45 seconds).

Type 88 point detonating fuzes.

Weapon in which used:

Type 98 10 cm/65 dual-purpose gun.

Type 98 10 cm/50 dual-purpose gun.

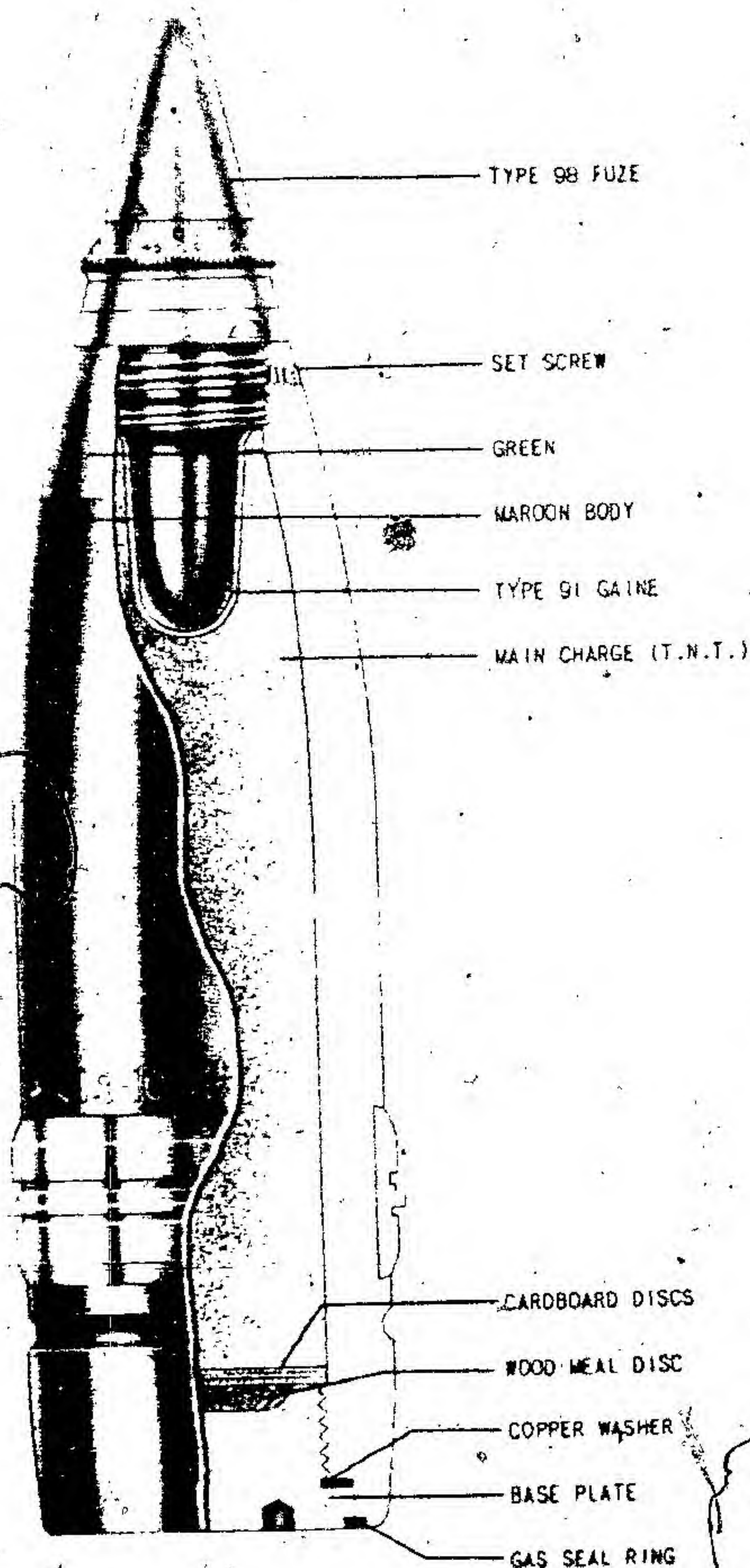


Figure 381—10-cm High-Explosive,

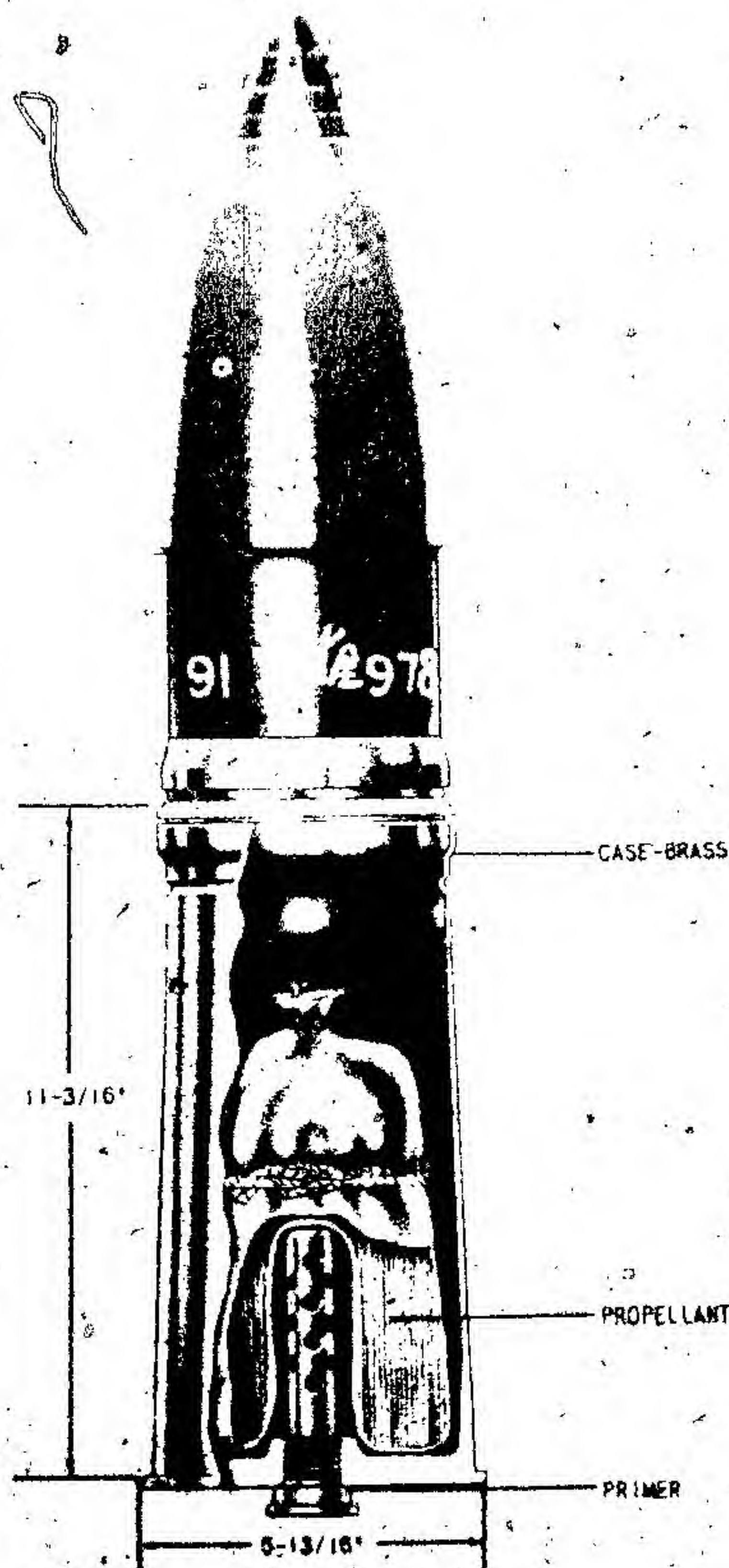


Figure 382—12-cm Short Complete Round (Fixed).

12-cm/Short (120-mm) (4.7-inch) Complete Round (Fixed)

Case:

Length: 11.19 inches.

Diameter of base: 5.81 inches.

Material: Brass or steel.

Weight (empty): No data.

- The case is crimped tightly into a groove in the base of the projectile by a single continuous crimp.

Propellant:

9 C3 (type 89 propellant): 1.1 pound (0.5 kg.).

Unperforated cylindrical sticks, approximately 0.9 mm ($\frac{1}{32}$ inch) by 6-7 inches, amber-colored double-base powder.

The propellant sticks are enclosed in a

compartmented bag of heavy brownish silk. Primer: Mk 1 case percussion primer, Model 4. Weapon in which used: Short 12 cm gun.

This is a short-barreled (12 caliber) gun of low muzzle velocity and light construction on a pedestal mount designed originally for use on the light decks of merchant ships. The purpose of this weapon is to deliver a relatively heavy projectile at a limited range for anti-submarine attack and to throw up low level anti-aircraft barrage.

This gun fires fixed ammunition; the breech block is of the interrupted thread type. This gun is the lighter-caliber counterpart of the short 20-cm gun, which has been found mounted ashore.

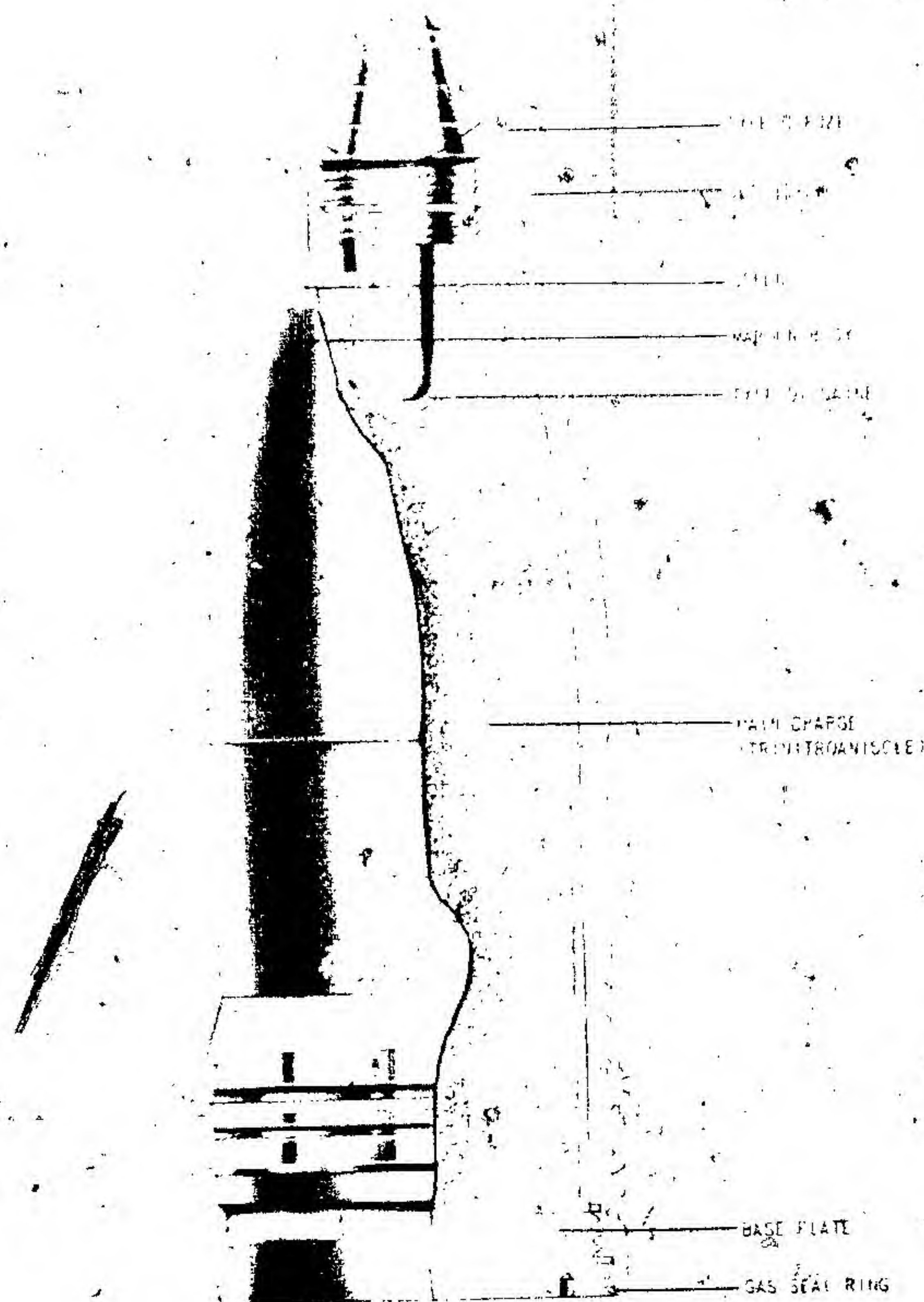


Figure 383—12-cm Short High-Explosive.

12-cm/Short (120-mm) (4.7-inch) High-Explosive

Assembled round:

Weight of complete round: No data.

Length of complete round (with type 0 fuze): 24.8 inches.

Projectile:

Weight of filled projectile (without fuze): 26.0 pounds.

Weight of projectile, empty: 20.5 pounds.

Weight stamped on rotating band (sample): 9.340 kg. (varies with individual projectiles).

Dimensions:

Length of projectile (without fuze): 12.6 inches.

Diameter at bourrelet: 4.7 inches (119.5 mm.)

Distance from base to rotating band: 1.5 inches.

Width of rotating band: 1.0 inches.

Radius of ogive: No data.

Filling:

Trinitroanisole (type 91 explosive): 5.5 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing:

Type 0 mechanical time fuze (red-nosed) for A. A. use.

Type 88 Model 4 point detonating fuze.

Weapon in which used: Short 12 cm gun.

Remarks: The extremely thin wall of this projectile is possible only by virtue of the low muzzle velocity of the howitzer-like weapon. The high charge/weight ratio is intended for effectiveness

in use as an under-water charge against submarines, though the projectile may also be time-fuzed for antiaircraft use.

12-cm (120-mm) (4.7-inch) Complete Round (Semifixed)

Case:

Length: 21.63 inches.

Diameter of base: 6.38 inches.

Material: Brass.

Weight (empty): 11.13 pounds.

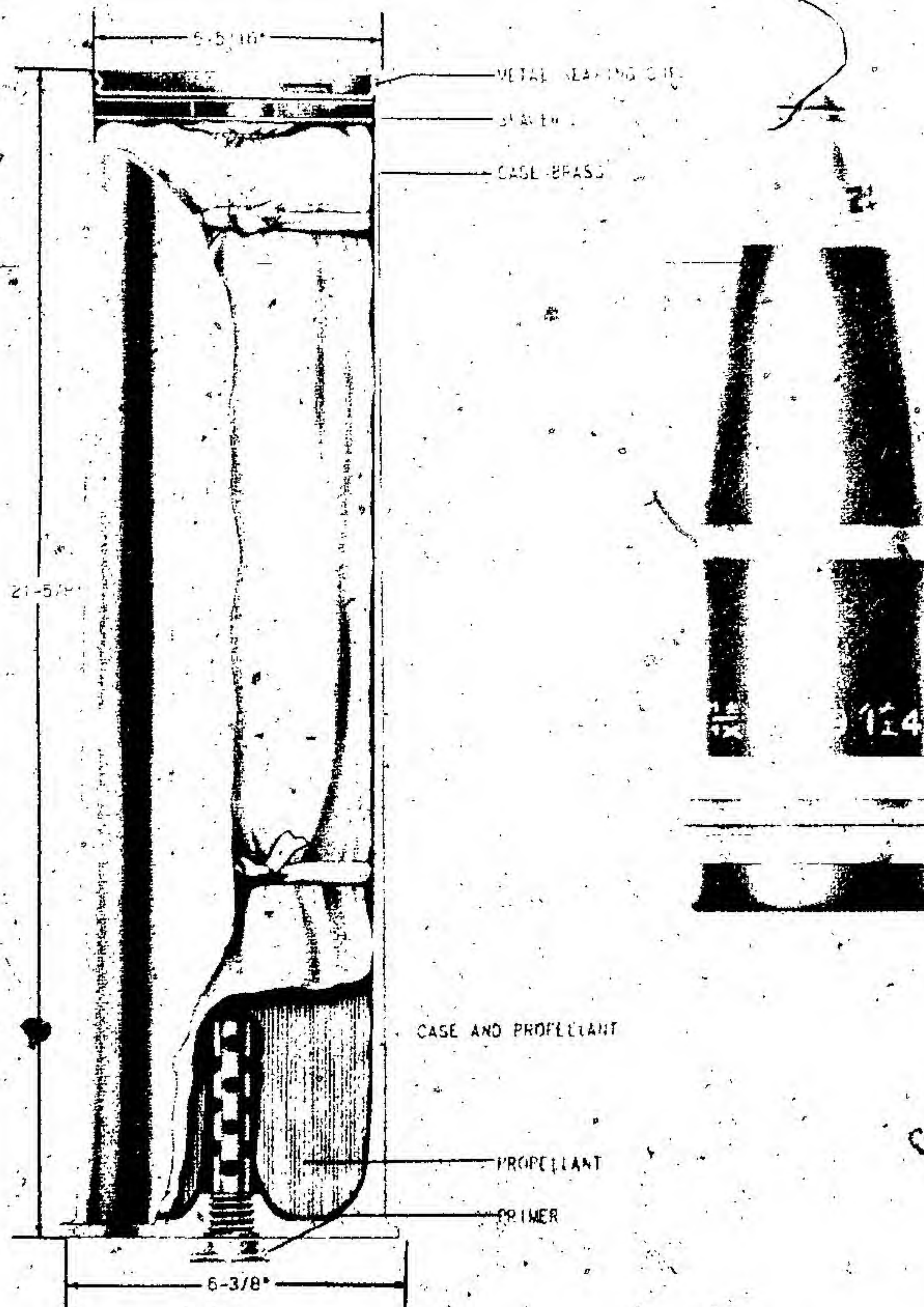


Figure 384—12-cm Complete Round (Semifixed).

JAPANESE EXPLOSIVE ORDNANCE

Propellant: 30 DC (type 13 propellant): 11.88 pounds (5.40 kg.).

Unperforated cylindrical sticks, approximately 3.0 mm ($\frac{1}{8}$ inch) by 19.4 inches (long sticks) or 6.4 inches (short sticks), amber-colored double-base powder.

The propellant sticks are enclosed in a bag of heavy brownish silk.

Primer: Mk 1 case percussion primer, Model 4.

Weapons in which used:

Type 3-year 12-cm/45 gun (low angle).

This is a pedestal-mounted deck gun characterized by having three recoil cylinders, all mounted below the tube. An interrupted thread breech block is hinged to swing horizontally to the right. This gun has been found both with and without an attached splinter shield.

British type 12-cm/40 gun (low angle).

This gun is characterized by having no recoil cylinders above the tube. An interrupted thread breech block is hinged to swing horizontally to the right. Guns of

original British manufacture as well as Japanese-made copies have been found in Japanese island defenses.

The following gun is known to use semi-fixed ammunition strongly resembling that for the two guns listed above, but exact size and description of propellant case is not available.

Type 11-year 12-cm/45 gun (low angle).

This gun is unique in having two recoil cylinders above the tube and one below. The breech block is the horizontal sliding type.

12-cm (120-mm) (4.7-Inch) High-Explosive (Ordinary Mk 3)

Weight of filled projectile (without fuze): 44.75 pounds.

Weight of projectile, empty: 41.14 pounds.

Weight stamped on rotating band (sample): 18.520 kg. (varies with individual projectiles)

Length of projectile (without fuze): 15.95 inches.

Diameter at bourrelet: 4.6 inches (119.0 mm).

Distance from base to rotating band: 0.78 inch.

Width of rotating band: 1.95 inches.

Radius of ogive: 4 cal.

Filling: Cast picric acid (shimose): 3.61 pounds.

The charge consists of two blocks of explosive cast and sealed in a waxed paper container, encased in a heavy cotton-flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 5-year point detonating fuze.

Weapon in which used:

British type 12-cm/40 gun (low angle).

Type 3-year 12-cm/45 gun (low angle).

Type 11-year 12-cm/45 gun (low angle).

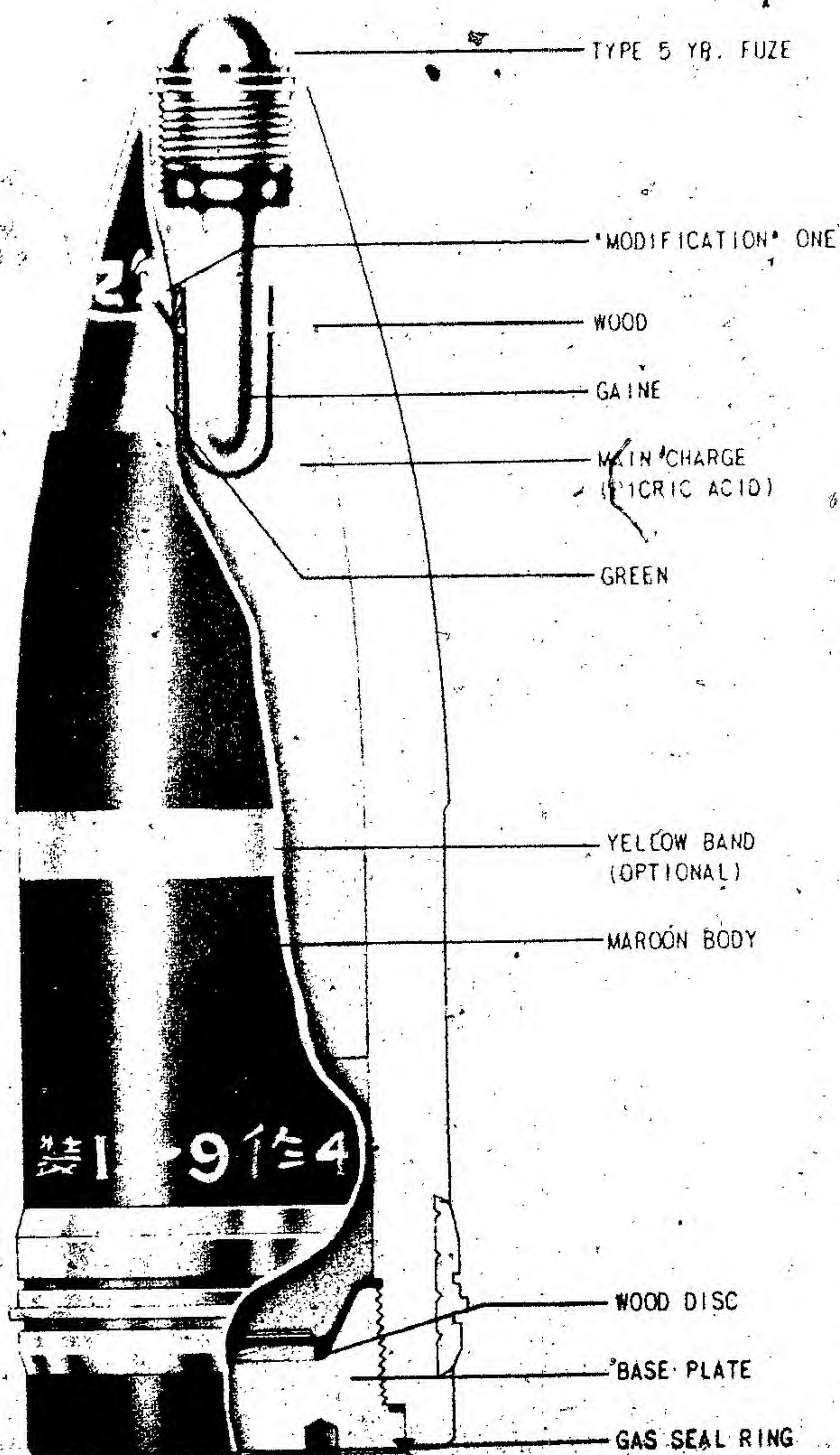


Figure 385—12-cm (Ordinary Mk 3) High-Explosive.

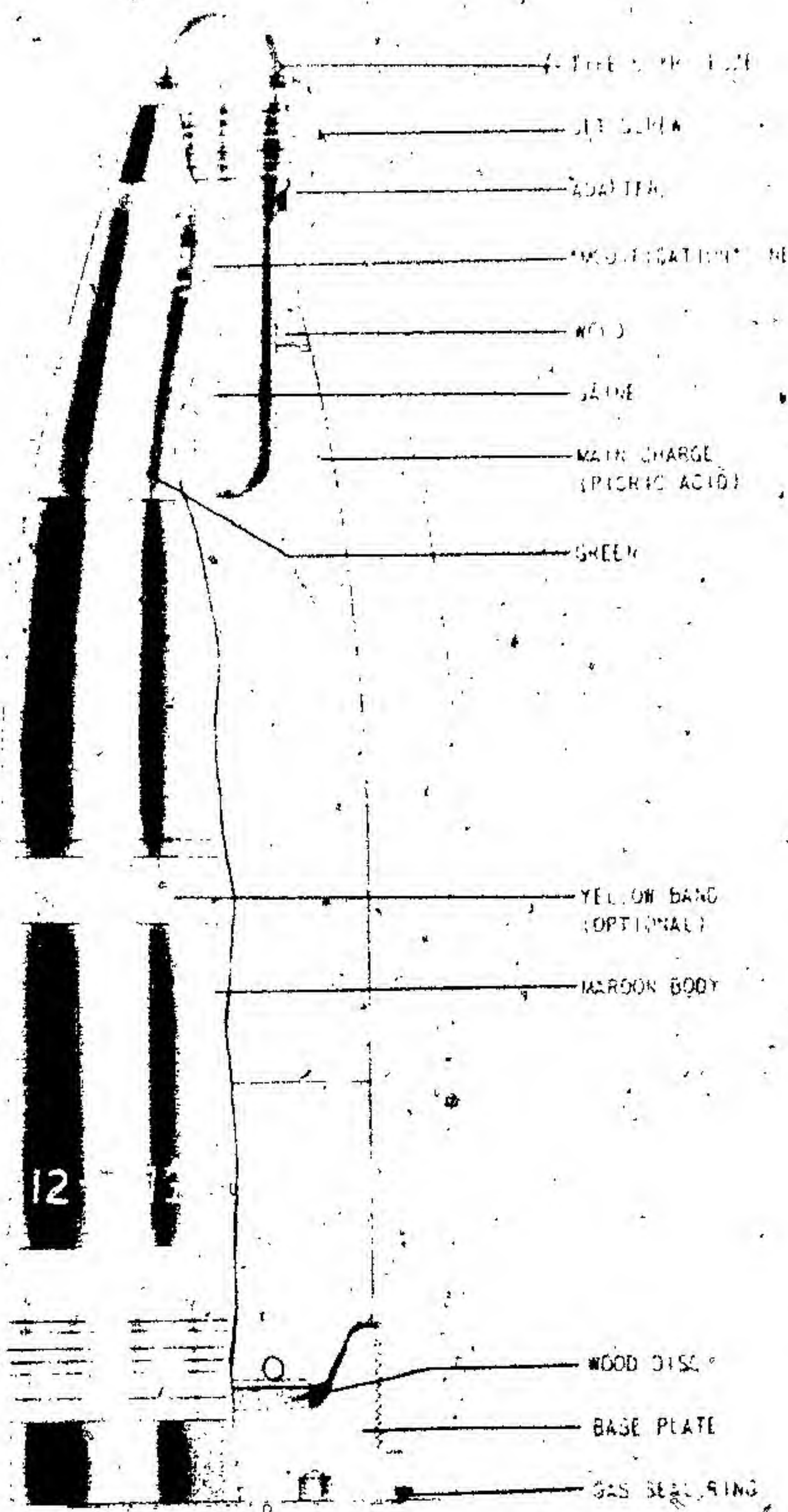


Figure 386—12-cm High-Explosive (Ordinary Mk 3 Mod 1).

12-cm (120-mm) (4.7-Inch) High-Explosive (Ordinary Mk 3 Mod 1)

Weight of filled projectile (without fuze): 44.75 pounds.

Weight of projectile, empty: 41.14 pounds.

Weight stamped on rotating band (sample): 18,520 kg. (varies with individual projectiles).

Length of projectile (without fuze or adapter): 14.1 inches.

Diameter at bourrelet: 4.7 inches (119.5 mm).

Distance from base to rotating band: 0.78 inch.

Width of rotating band: 1.95 inches.

Radius of ogive: 4 cal.

Filling: Cast picric acid (shimose) 3.61 pounds.

The charge consists of two blocks of explo-

sive cast and sealed in a waxed paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing:

a. With adapter: Type 5-year point detonating fuze.

b. Without adapter: Type 88 point detonating fuze.

This projectile cannot be fuzed with standard mechanical time fuzes for A. A. use because it will not accommodate the auxiliary gaine used with these fuzes.

Weapons in which used:

British type 12-cm/40 gun (low angle).

Type 3-year 12-cm/45 gun (low angle).

Type 11-year 12-cm/45 gun (low angle).

12-cm (120-mm) (4.7-Inch) High-Explosive (Ordinary Mk 4)

Weight of projectile filled (without fuze): No data.

Weight of projectile, empty: 39.06 pounds.

Weight stamped on rotating band (sample): 17.62 kg. (varies with individual projectile).

Length of projectile (without fuze): 13.94 inches.

Diameter at bourrelet: 4.7 inches (119.5 mm).

Distance from base to rotating band: 1.19 inches.

Width of rotating band: 1.25 inches.

Radius of ogive: No data.

Filling: Picric acid (shimose): No data.

Fuzing:

Type 91 mechanical time fuze.

Type 88 point detonating fuzes.

Weapon in which used:

British type 12-cm. gun (low angle).

Type 3-year. 12-cm/45 gun (low angle).

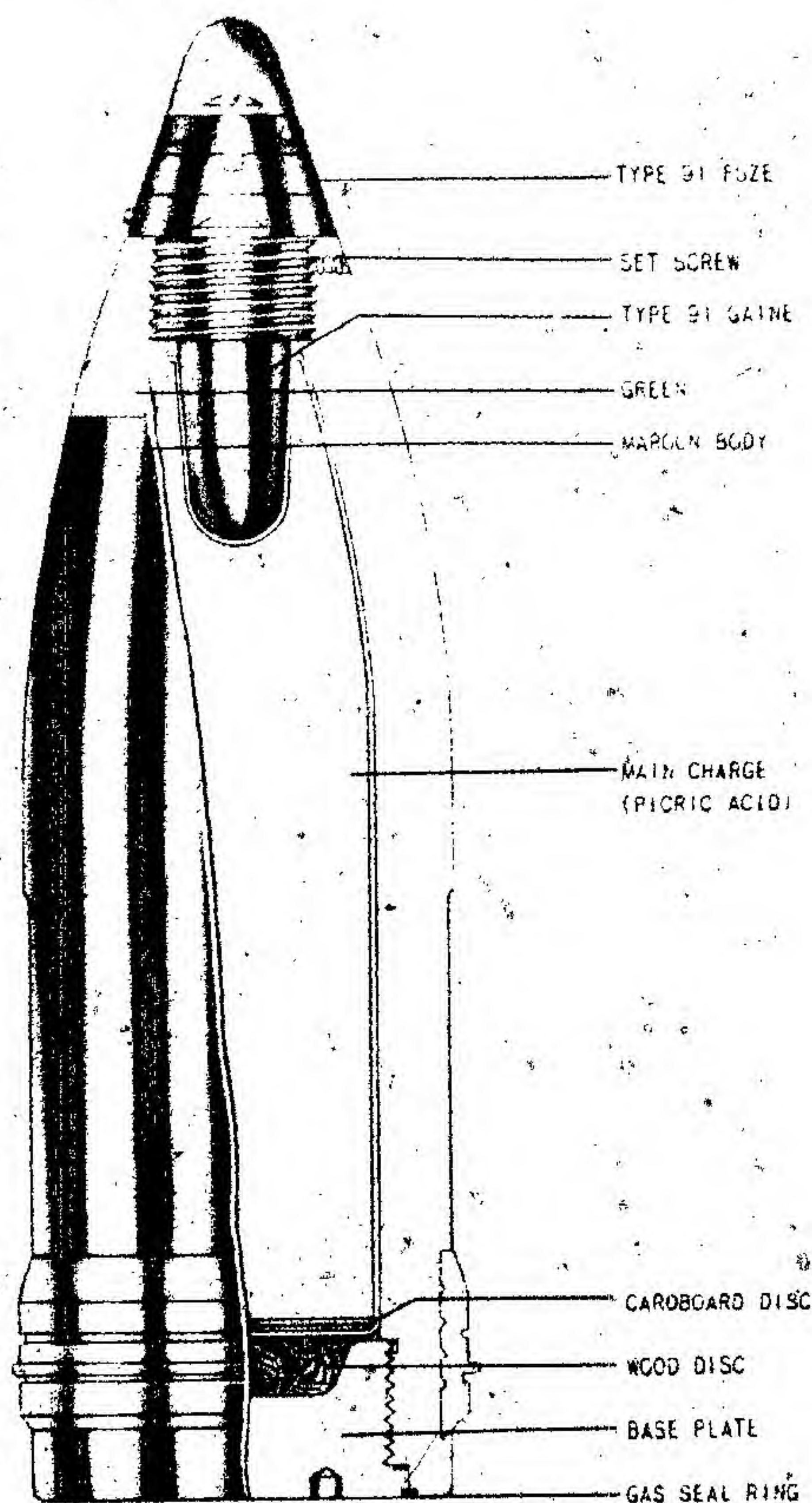


Figure 387—12-cm (Ordinary Mk 4) High-Explosive.

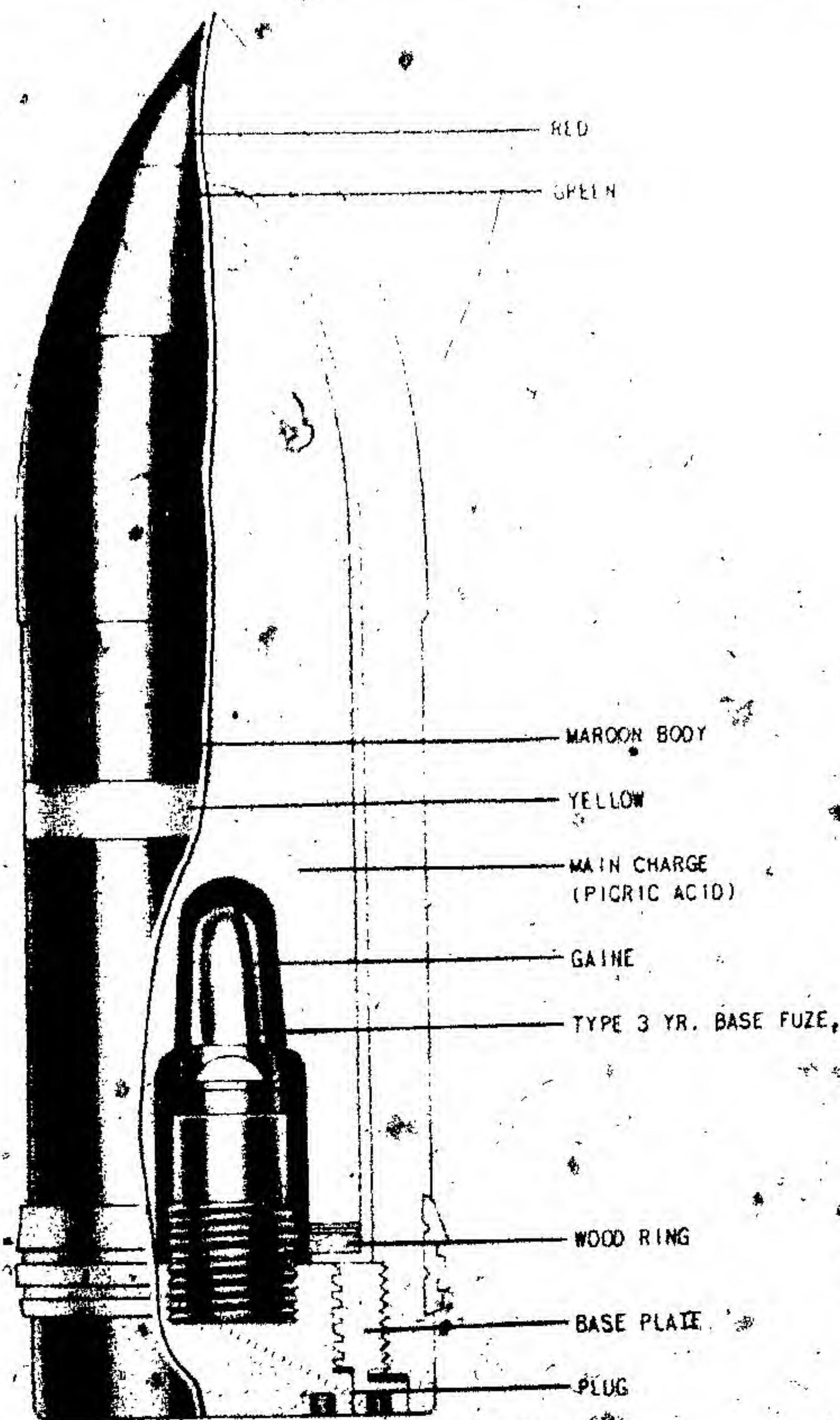


Figure 388—12-cm Common.

12-cm (120-mm) (4.7-inch) Common Projectile

Weight of filled projectile (with fuze): 45.12 pounds.

Weight of empty projectile: 40.56 pounds.

Length of projectile: 16.39 inches.

Diameter at bourrelet: 4.7 inches (119.5 mm).

Distance from base to rotating band: 1.19 inches.

Width of rotating band: 1.25 inches.

Radius of ogive: No data.

Filling: Picric acid (shimose): No data.

Fuzing: Type 3-year Mk 1 base fuze.

Weapons in which used:

British type 12-cm. gun (low angle).

Type 3-year 12-cm/45 gun (low angle).

Type 11-year. 12-cm/45 gun (low angle).

12-cm (120-mm) (4.7-Inch) Illuminating Projectile

Weight of filled projectile: 44 pounds.
 Weight of empty projectile: No data.
 Weight stamped on rotating band: No data.
 Length of projectile (without fuze): $13\frac{1}{8}$ inches.
 Diameter at bourrelet: $4\frac{1}{8}$ inches (119 mm).
 Distance from base to rotating band: No data.
 Width of rotating band: $1\frac{1}{8}$ inches.
 Radius of ogive: No data.

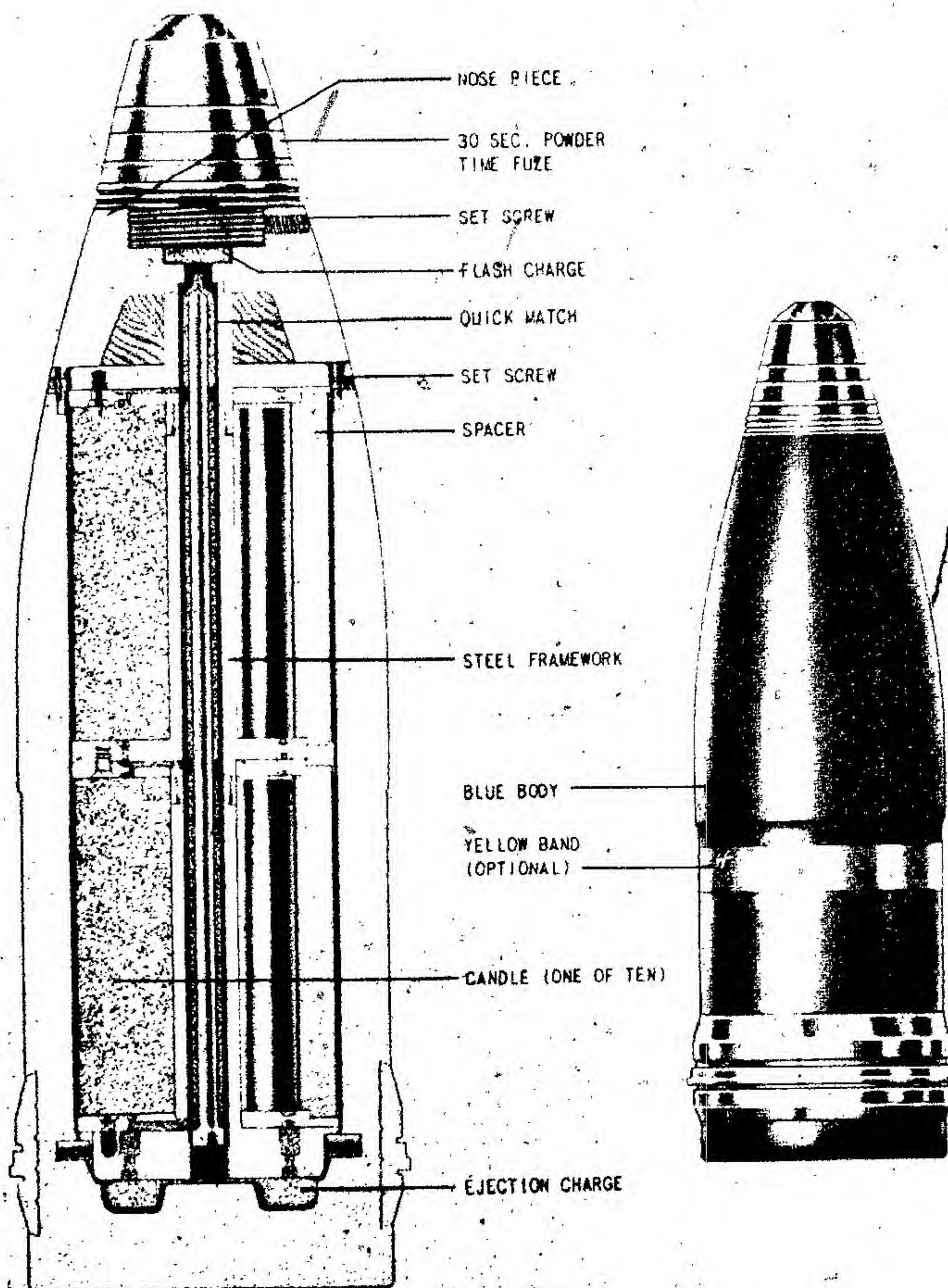


Figure 389—12-cm Illuminating.

Filling: Expelling charge (black powder): 0.5 ounce.

Illuminant: These are 10 pyrotechnic cylinders arranged in two layers of 5 cylinders each. A cylinder is formed of a tough waxed cardboard tube containing a silver pyrotechnic mixture in the center and a reddish-brown pyrotechnic mixture in either end.

Weight (each cylinder): 5.4 ounce.

Analysis of illuminant:

- Barium nitrate: 35.6 percent.
- Potassium nitrate: 10.4 percent.
- Magnesium: 38.0 percent.
- Wax: 13.9 percent.
- Carbon: 0.8 percent.
- Sulphur: 1.3 percent.

Analysis of first fire compound:

- Potassium nitrate: 63.2 percent.
- Iron oxide: 3.8 percent.
- Aluminum oxide: 1.1 percent.
- Sulphur: 8.2 percent.
- Wax: 5.5 percent.
- Glass: 6.1 percent.
- Carbon: 12.1 percent.

Cylinder metal frame:

This frame fills the cavity of the projectile and is positioned by studs. There are three metal discs attached to a central spindle which provides a method of functioning and serves to support the pyrotechnic increments. Arranged about the circumference of this frame are two layers of five steel wedges which position the pyrotechnic increments within the frame.

Fuzing: 30-second time fuze.

Weapons in which used:

- Type 11-year. 12-cm/45 gun.
- Type 3-year. 12-cm/45 gun.

Operation: When the fuze functions, the flash from the black powder magazine ignites a small black powder charge in the nose of the projectile, which in turn ignites the powder trains in the central spindle. The flash from this train ignites the powder trains in the three discs and thus the ten increments and the ejecting charge. As the cylinder is blown from the case, it shears the studs and forces the nose and body of the projectile apart.

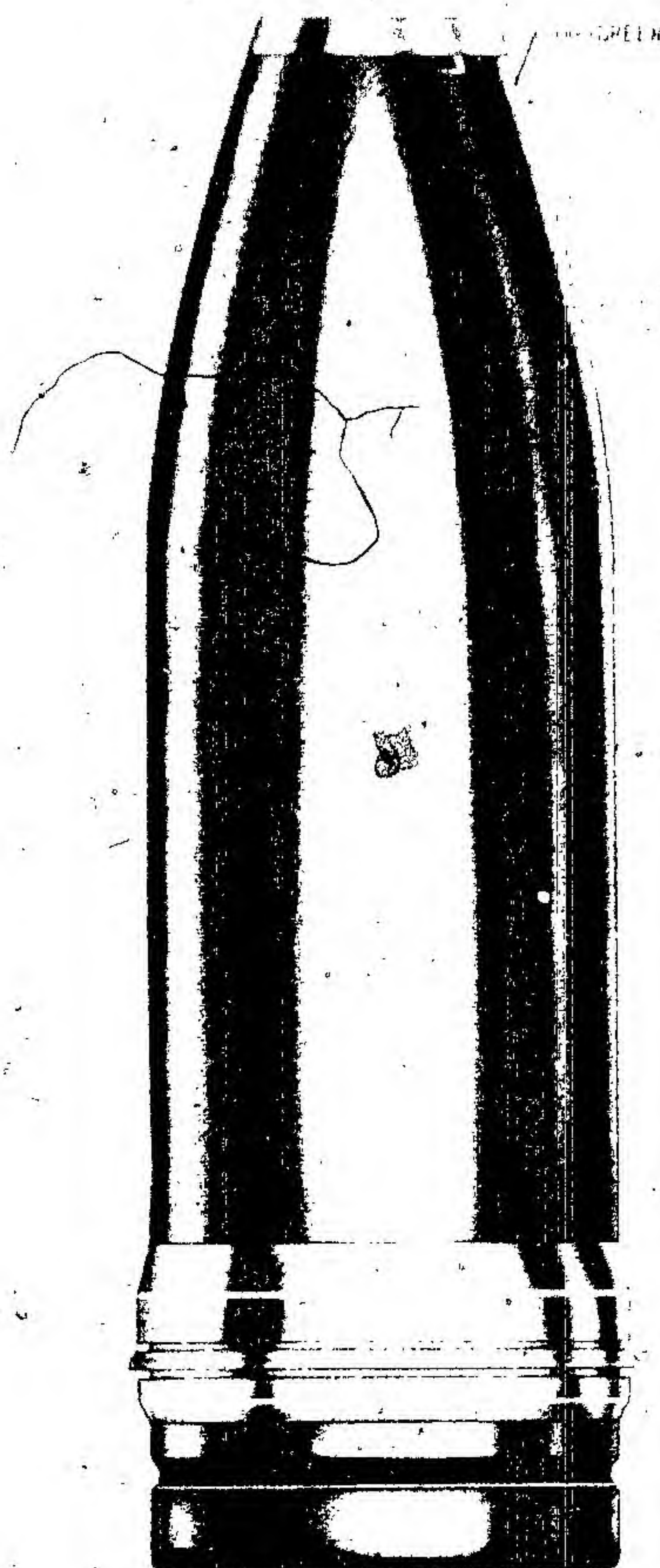


Figure 390—12-cm Target.

12-cm (120-mm) (4.7-Inch) Target Projectile

Weight of filled projectile (without fuze): 43.27 pounds.

Weight of empty projectile: No data.

Weight stamped on rotating band (sample):
19.02 kg (varies with individual projectiles).

Length of projectile (without fuze): 15.56 inches.

Filling: No data.

Diameter at bourrelet: 4.70 inches (119.5 mm).

Fuzing: 30-second time fuze.

Distance from base to rotating band: 1.56 inches.

Weapon in which used:

Width of rotating band: 2.00 inches.

Type 11-year. 12-cm/45 gun.

Radius of ogive: 4 cal.

Type 3-year. 12-cm/45 gun.

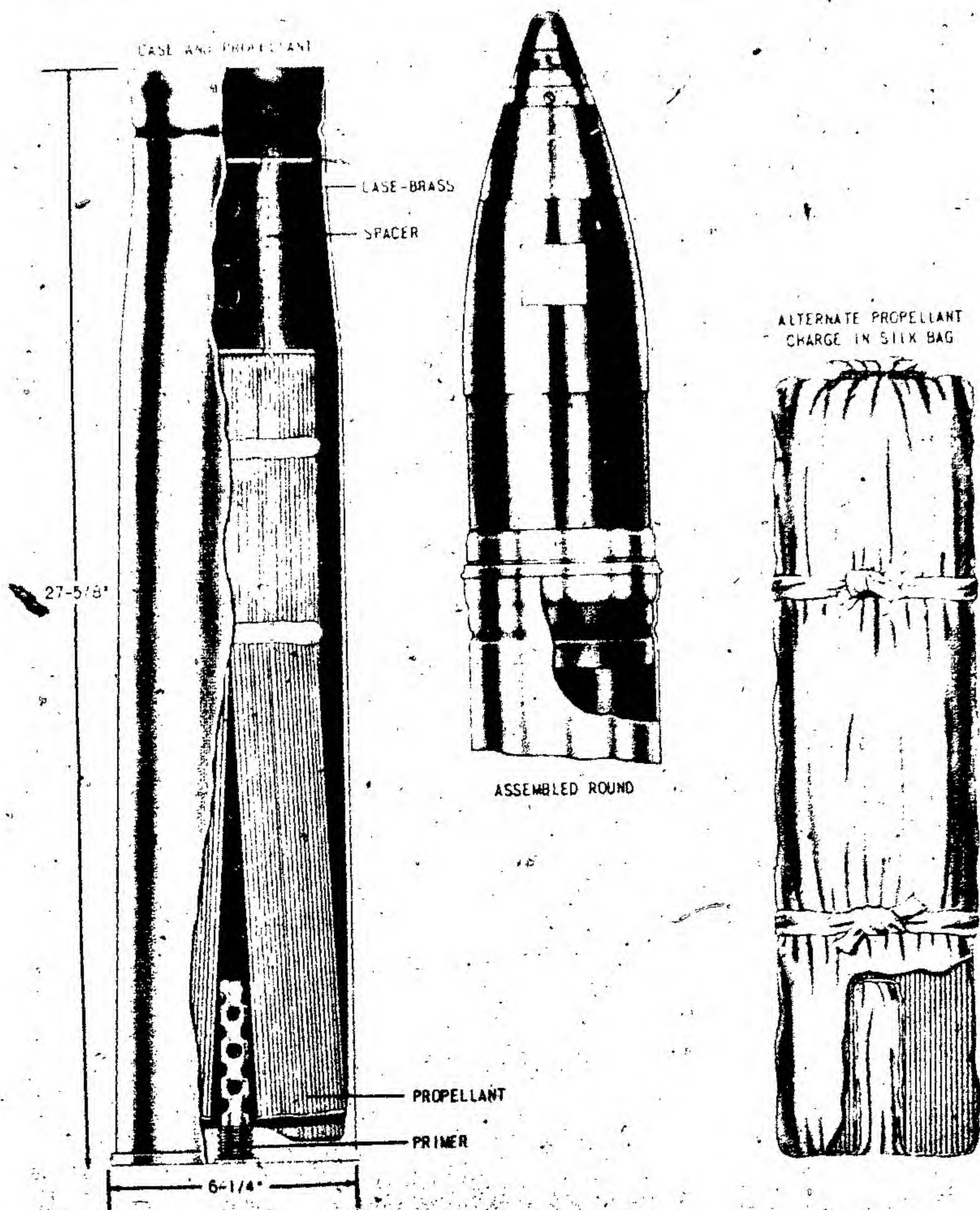


Figure 391—12-cm Complete Round (Fixed).

12-cm (120-mm) (4.7-inch) Complete Round (Fixed)

Case:

Length: 27.63 inches.
 Diameter of base: 6.25 inches.
 Material: Brass.
 Weight (empty): 18.59 pounds.

The case is crimped tightly into a groove in the base of the projectile by a single continuous crimp.

Propellant, 30 DC (type 13 propellant): 12.0 pound (5.50 kg).

Unperforated cylindrical sticks, approximately 3.0 mm ($\frac{1}{8}$ -inch- $\frac{1}{8}$ -inch) by 19.8 inches, graphited double-base powder.

In the H. E. rounds recovered, the propellant sticks are enclosed in a bag of heavy brownish silk.

In the incendiary shrapnel round the sticks of propellant were tied together and placed in the case without being enclosed in the customary coarse silk bag. The latter arrangement may be a new trend not necessarily limited to the round in which it was first found.

Primer: Mk 2 case percussion primer, Model 4.

Weapon in which used: Type 10th year 12-cm/45 dual-purpose gun.

This weapon is a pedestal-mounted gun designed for antiaircraft use aboard ship which has been found ashore either with or without a distinctive gun-house type of shield. The gun is manually controlled. The breech-block is the horizontal type, sliding to the right. This has been one of the most common and most effective Japanese land-based A. A. guns.

12-cm (120-mm) (4.7-inch) High-Explosive (Ordinary Mod 1)

Assembled round:

Weight of complete round: 74.03 pounds.

Length of complete round (with type 91 fuze): 41.75 inches (approximately).

Projectile:

Weight of filled projectile (without fuze): 43.34 pounds.

Weight of empty projectile: 39.38 pounds.

Weight stamped on rotating band (sample): 17.9 kg. (varies with individual projectiles).

Dimensions:

Length of projectile (without fuze): 13.95 inches.

Diameter at bourrelet: 4.6 inches (119.0 mm.).

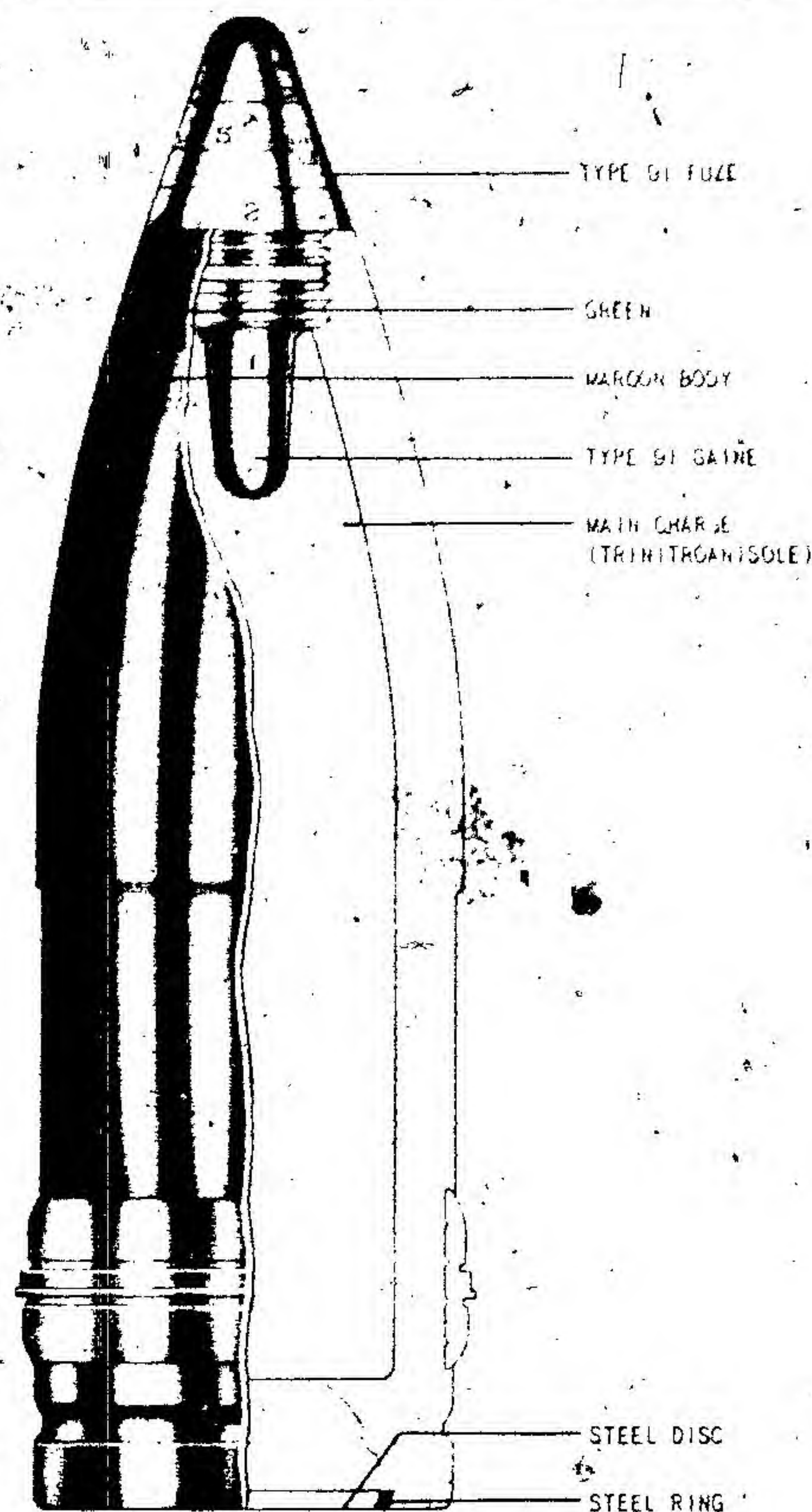


Figure 392—12-cm (Ordinary Mod 1) High-Explosive.

Distance from base to rotating band: 1.56 inches.

Width of rotating band: 1.9 inches.

Radius of ogive: 4 cal.

Filling:

Trinitroanisol (type 91 explosive): 3.96 pounds.

The explosive is cast directly in the projectile body.

Fuzing:

Type 91 mechanical time fuze.

Type 88 point detonating fuzes.

Weapon in which used:

Type 10-year 12-cm/45 dual-purpose gun.

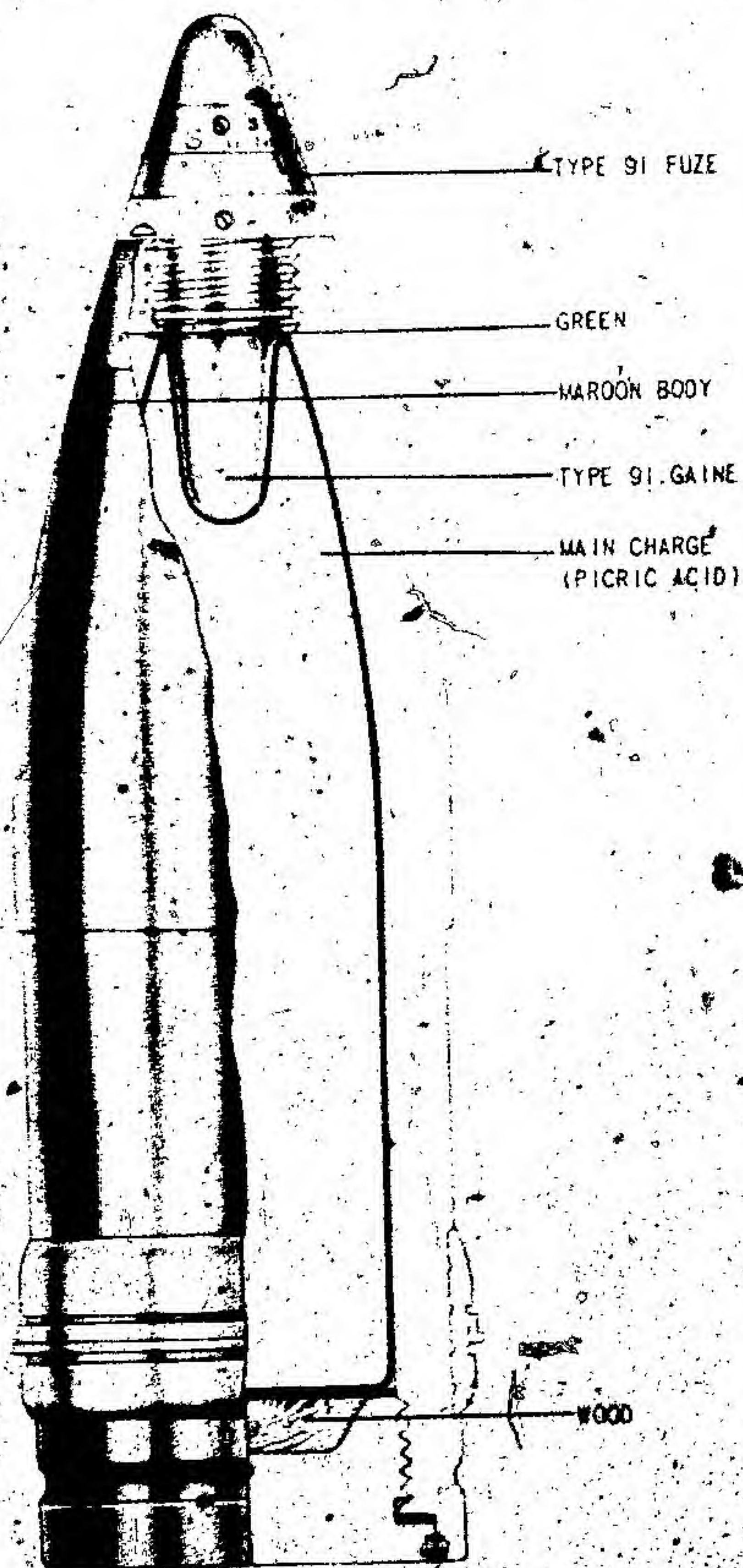
JAPANESE EXPLOSIVE ORDNANCE

Remarks: The base of the projectile is slightly recessed to receive a steel plate which is locked in by a steel ring. This arrangement is presumed to be a seal to prevent the propellant gases entering possible flaws in the solid base of the projectile. A similar feature is common in U. S. Army projectiles.

12-cm (120-mm) (4.7-inch) High-Explosive (Ordinary Mod 2)

Assembled round:

Weight of complete round: 72.53 pounds.



Length of complete round (with type 91 fuze):
41.75 inches (approximately).

Projectile:

Weight of filled projectile (without fuze):
41.84 pounds.

Weight of empty projectile: 38.41 pounds.

Weight stamped on rotating band (sample):
17.46 kg. (varies with individual projectiles).

Dimensions:

Length of projectile (without fuze): 13.95 inches.

Diameter at bourrelet: 4.6 inches (119 mm).

Distance from base to rotating band: 1.56 inches.

Width of rotating band: 1.9 inches.

Radius of ogive: 4 cal.

Filling: Cast picric acid (shimose): 3.43 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed-paper container, encased in a heavy cotton-flannel bag and sealed in the projectile with paraffin.

Fuzing:

Type 91 mechanical time fuze.

Type 88 point detonating fuzes.

Weapon in which used: Type 10th year 12-cm/45 dual-purpose gun.

12-cm (120-mm) (4.7-inch) Incendiary Shrapnel

Assembled round:

Weight of complete round: 75.66 pounds.

Length of complete round (with type 91 fuze): 41.15 inches (approximate).

Projectile:

Weight of filled projectile (without fuze):
44.97 pounds.

Figure 393—12-cm (Ordinary Mod 2) High-Explosive.

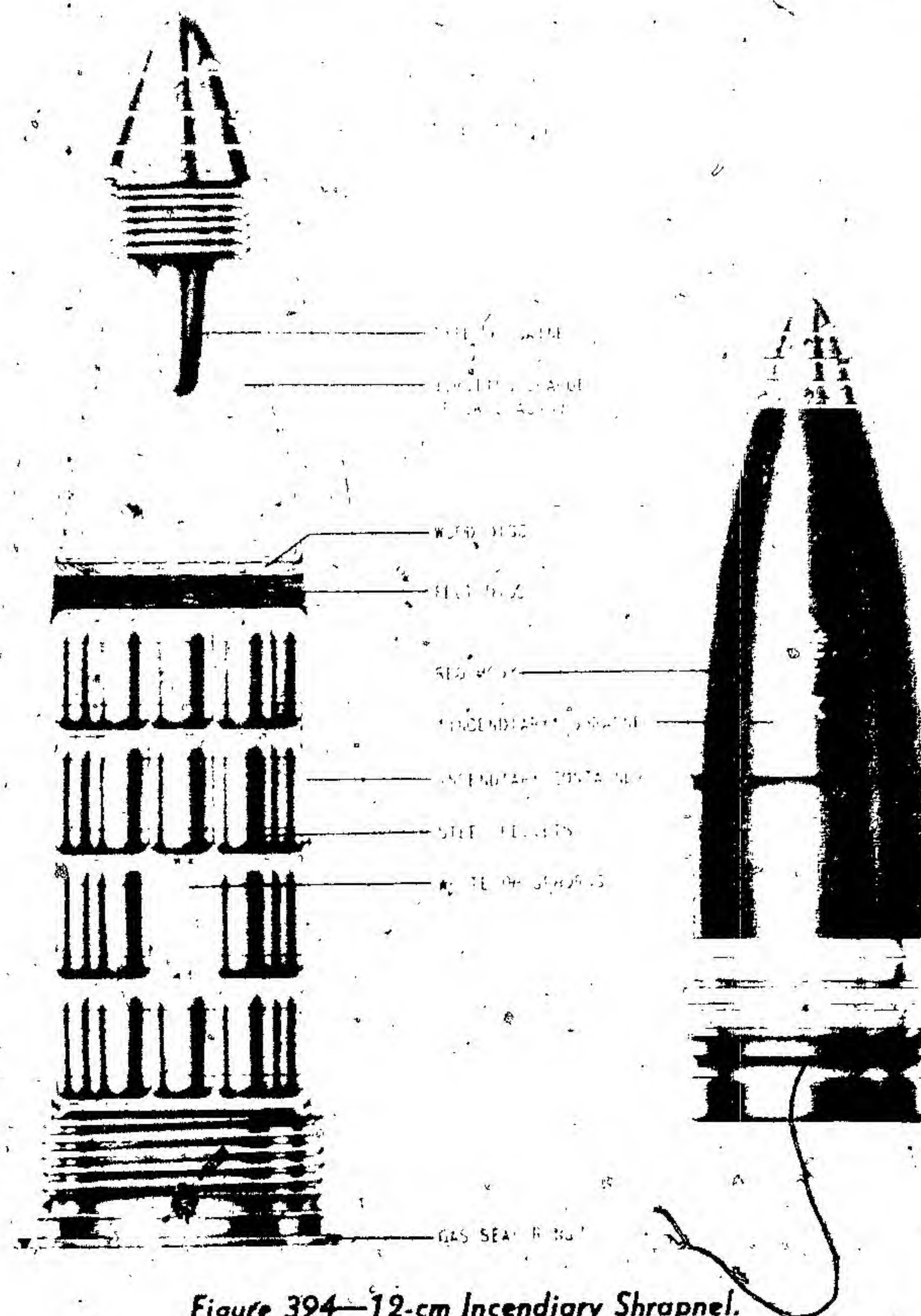


Figure 394—12-cm Incendiary Shrapnel.

Weight of empty projectile: 33.13 pounds.

Weight stamped on rotating band (sample):
15.06 kg. (varies with individual projectiles).

Dimensions:

Length of projectile (without fuze): 13.95 inches.

Diameter at bourrelet: 4.6 inches (119.0 mm).

Distance from base to rotating band: 1.56 inches.

Width of rotating band: 1.9 inches.

Radius of ogive: 4 cal.

Filling:

Cast picric acid (shimose): 1.19 pounds.

Incendiary charge (W. P. and 48 steel pellets): 8.55 pounds.

The explosive charge consists of a block of explosive cast and sealed in a waxed-paper container, encased in a heavy cotton-flannel bag and sealed in the nose of the projectile with paraffin.

Fuzing:

Type 91 mechanical time fuze.

Type 88 point detonating fuzes.

Weapon in which used: Type 10 year 12 cm/45 dual-purpose gun.

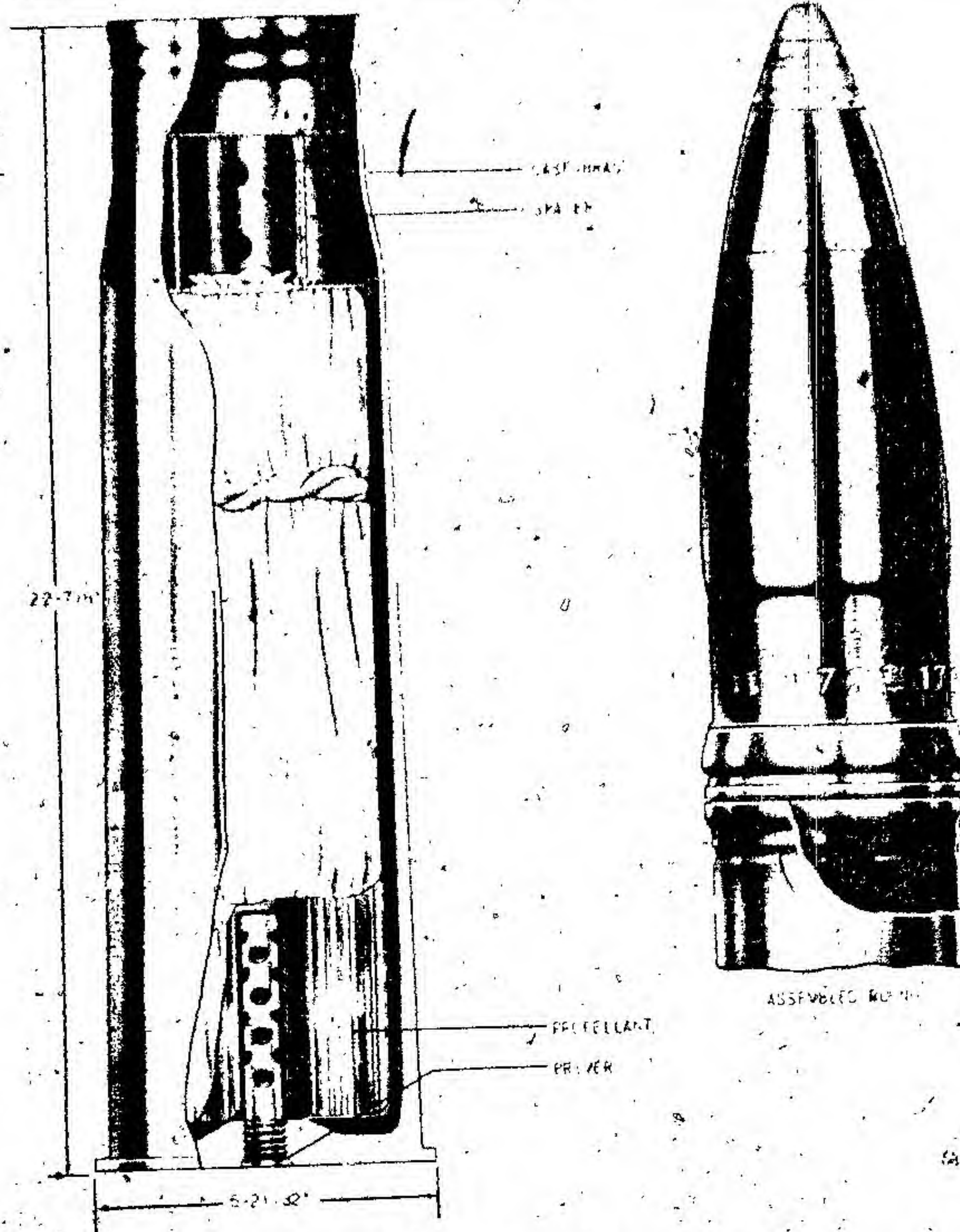


Figure 395—12.7-cm Complete Round (Fixed).

12.7-cm (127-mm) (5-Inch) Complete Round (Fixed)

Case:

Length: 22.88 inches.

Diameter of base: 6.66 inches.

Material: Brass.

Weight (empty): 16 28 pounds.

The case is crimped tightly into a groove in the base of the projectile by a single continuous crimp.

Propellant:

21 DC (type 13 propellant): 8.87 pounds (4.03 kg.).

Unperforated cylindrical sticks, approximately 2.1 mm (.079 in.) by 15.75 in., graphited double-base powder.

The propellant sticks are enclosed in a compartmented bag of heavy brownish silk.

Primer: Mk 2 case percussion primer Model 4.
Weapons in which used:

Type 88 12.7-cm/40 dual-purpose gun.

Type 89 12.7-cm/40 dual-purpose gun (twin).

This latter is a modern gun, paired in a twin power-driven mount designed especially for antiaircraft aboard ships. It has been found ashore, unaltered, in the characteristic gun-house mount used aboard ship.

Special features of this gun and mount are horizontal opposed sliding breech blocks, full power drive, and automatic fuze-setting accomplished as the loading tray moves the round into position to be rammed. The arrangement for loading and fuze-setting and the general plan of the mount corresponds closely to that of the Type 98 10-cm/65 twin mount.

12.7-cm (127-mm) (5-Inch) High-Explosive**Assembled round:**

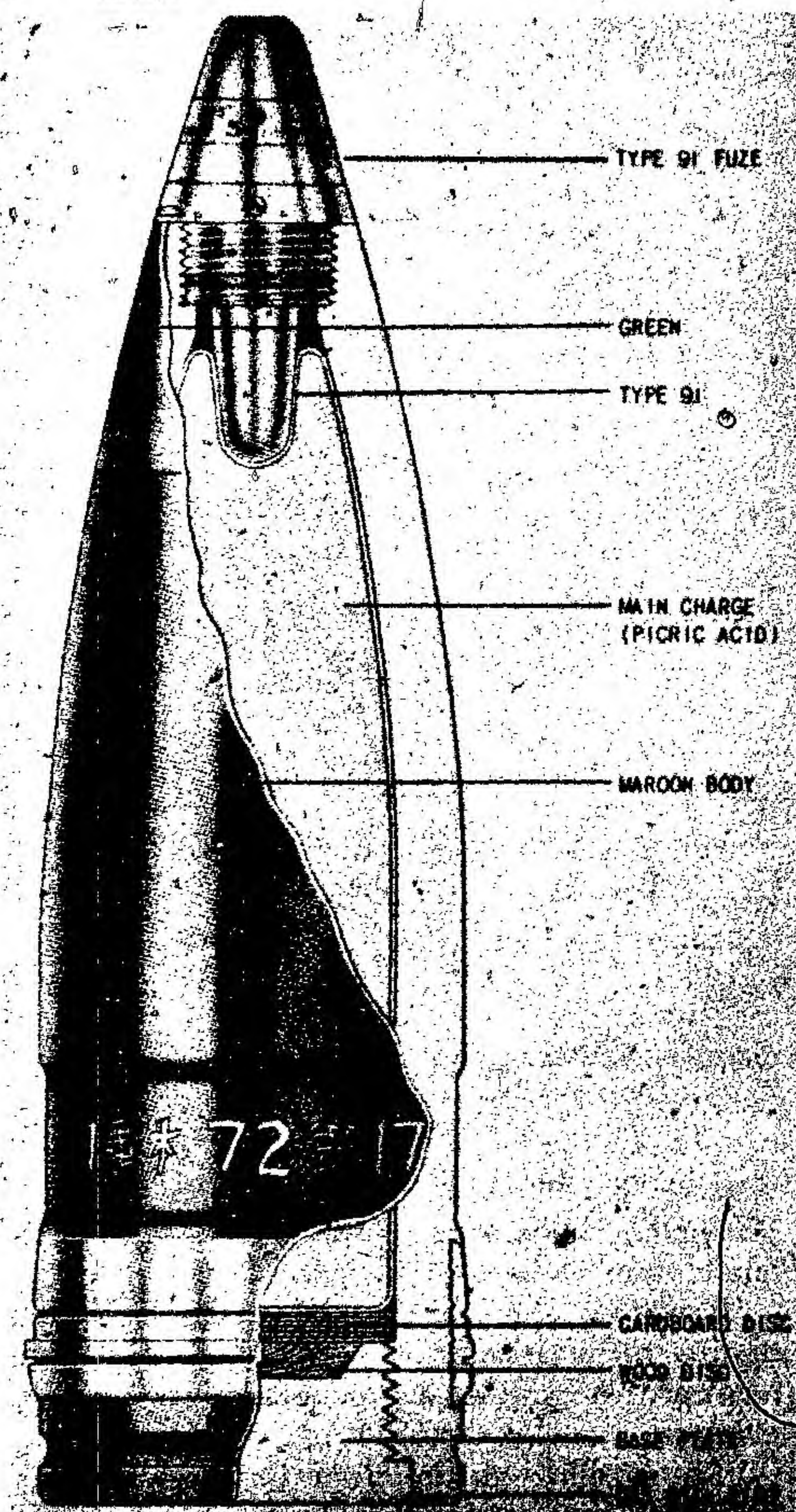
Weight of complete round: 73.57 pounds.

Length of complete round (with type 91 fuze):

36.0 inches (approximately).

Projectile:Weight of filled projectile (without fuze):
48.42 pounds.

Weight of empty projectile: 44.48 pounds.

Weight stamped on rotating band (sample):
20.170 kg. (varies with individual projectiles).**Figure 396—12.7-cm High-Explosive.****Dimensions:**

Length of projectile (without fuze): 14.9 inches.

Diameter at bourrelet: 4.96 inches (126.0 mm).

Distance from base to rotating band: 1.19 inches.

Width of rotating band: 1.95 inches.

Radius of ogive: 6 cal.

Filling:

Cast picric acid (shimose): 3.94 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed-paper container, encased in a heavy cotton-flannel bag and sealed in the projectile with paraffin.

Fuzing:

Type 91 mechanical time fuze.

Type 88 point detonating fuze.

Weapon in which used:

Type 89 12.7-cm/40 dual-purpose gun.

Type 88 12.7-cm/40 dual-purpose gun.

(Type 3 Ordinary) 12.7-cm (127-mm) (5-Inch) Incendiary Shrapnel**Assembled round:**

Weight of complete round: 78.36 pounds.

Length of complete round (without fuze):
36.43 inches.**Projectile:**Weight of filled projectile (without fuze):
53.21 pounds.

Weight of empty projectile: No data.

Weight stamped on rotating band (sample):
17.17 kg. (varies with individual projectile).**Dimensions:**

Length of projectile (without fuze): 14.8 inches.

Diameter at bourrelet: 4.97 inches (126.3 mm).

Distance from base to rotating band: 1.25 inches.

Width of rotating band: 2.0 inches.

Radius of ogive: 6 cal.

Filling:

Cast picric acid (shimose): 162 grams.

Tetryl: 2.3 grams.

Lead Azide: 0.13 grams.

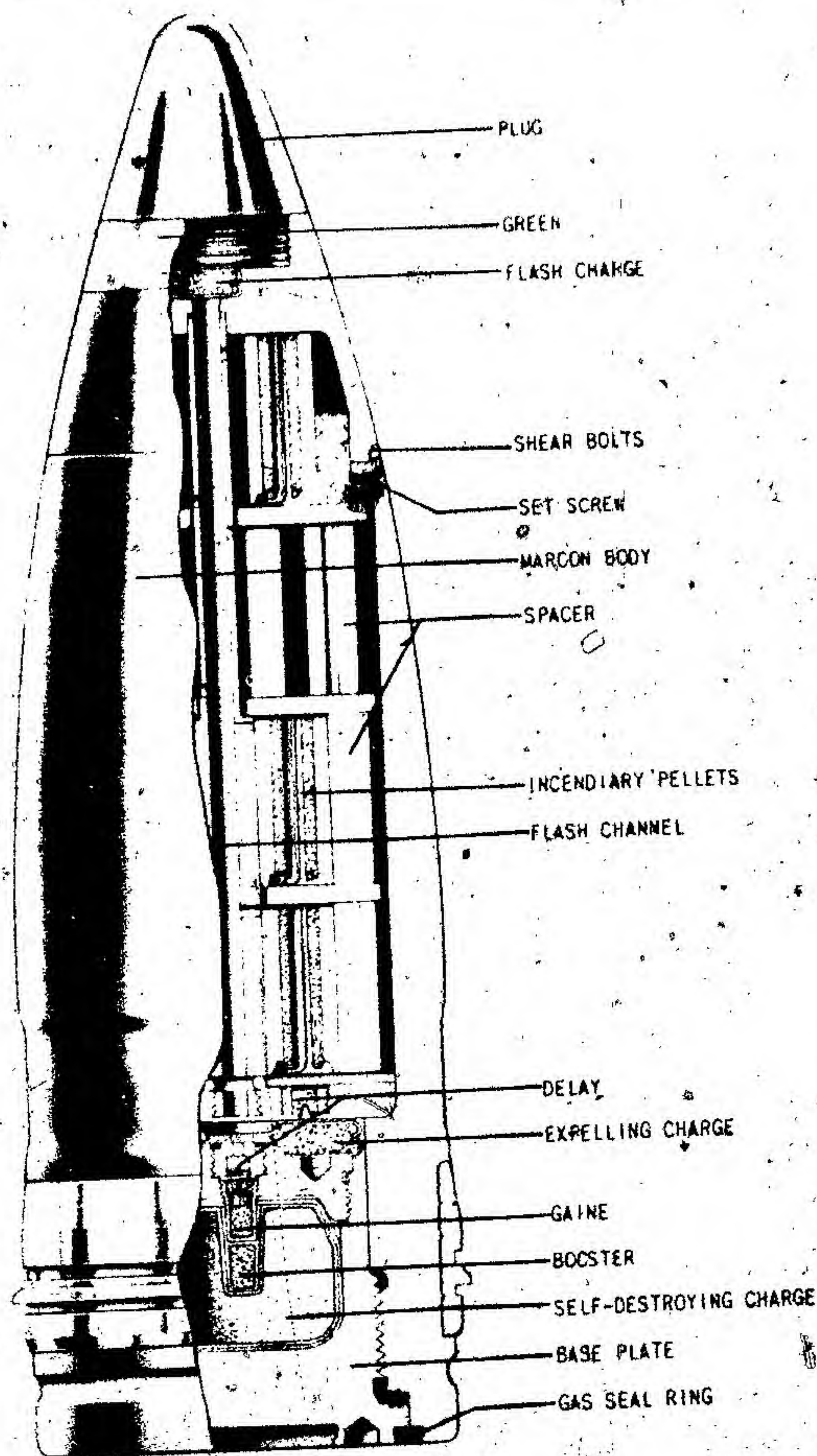


Figure 397—12.7-cm Incendiary Shrapnel (Ordinary Type 3).

Black powder: 35 grams.
Incendiary charge (43 steel pellets 50 mm in length and 20 mm in diameter filled with a dry incendiary mix of the following composition:

Magnesium: 54 percent.
Barium dioxide: 26 percent.
Rubber: 15 percent.
Iron oxide: 1.5 percent.
Sulphur: 3 percent.

Fuzing: Type 91 mechanical time fuze.
Weapon in which used: Type 89 12.7-cm/40 high-angle gun.

Remarks: The black powder charge in the nose ignites the incendiary pellets and flashes down the central tube igniting relay disks and the expelling charge.

The expelling charge ejects the incendiary pellets and ignites a primer in the base section which detonates the gaine and bursting charge.

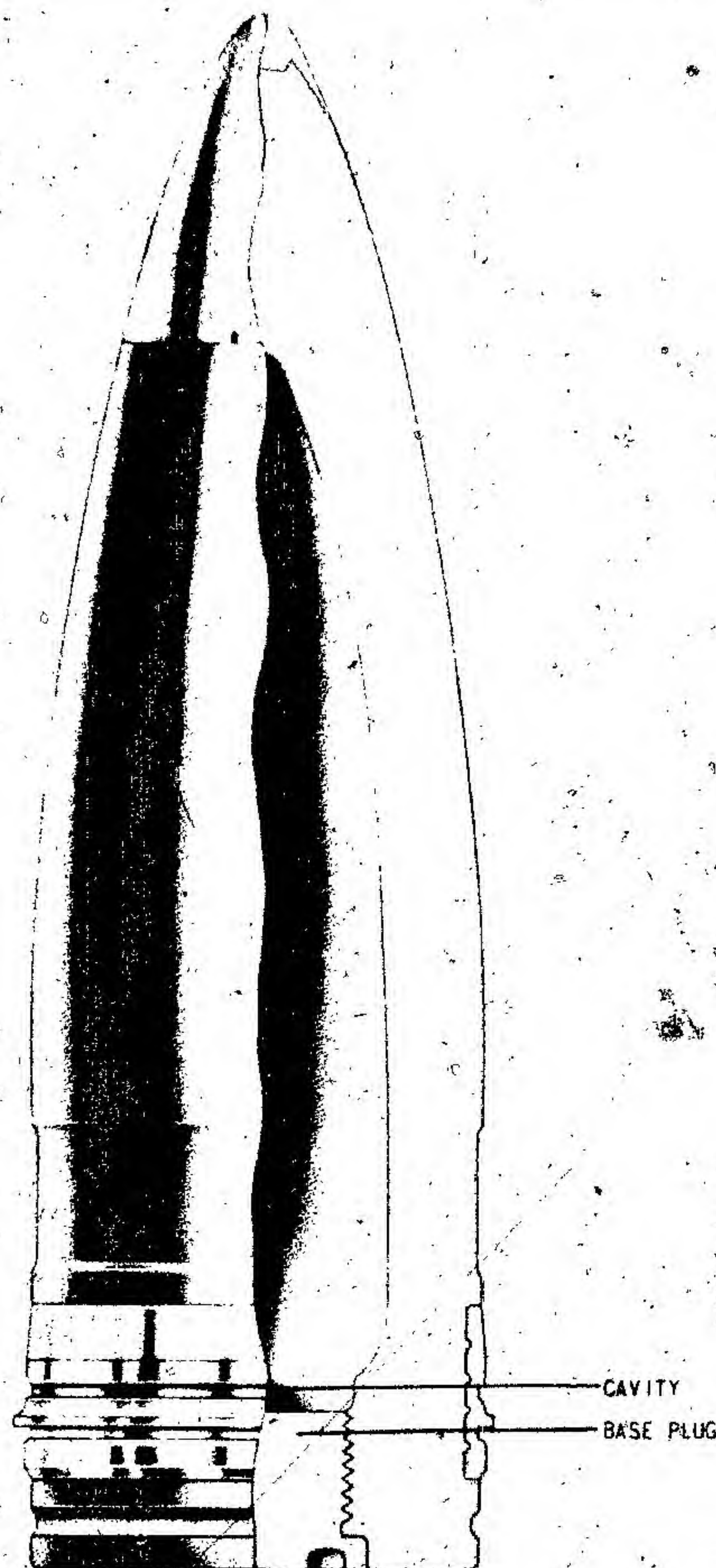


Figure 398—12.7-cm Practice.

12.7-cm (127-mm) (5-Inch) Practice

Assembled round:

Weight of complete round: 75.84 pounds.
Length of complete round: 40.20 inches.

Projectile:

Weight of filled projectile: 50.69 pounds.
Weight of empty projectile: 48.10 pounds.
Weight stamped on rotating band (sample):
21.80 kg. (varies with individual projectile).

Dimensions:

Length of projectile: 17.32 inches.
Diameter at bourrelet: 4.97 inches (126.3 mm).
Distance from base to rotating band: 1.61 inches.
Width of rotating band: 1.95 inches.
Radius of ogive: 6 cal.

Filling: Sand.

Fuzing: None.

Weapon in which used: Type 89 12.7-cm/40 dual-purpose gun.

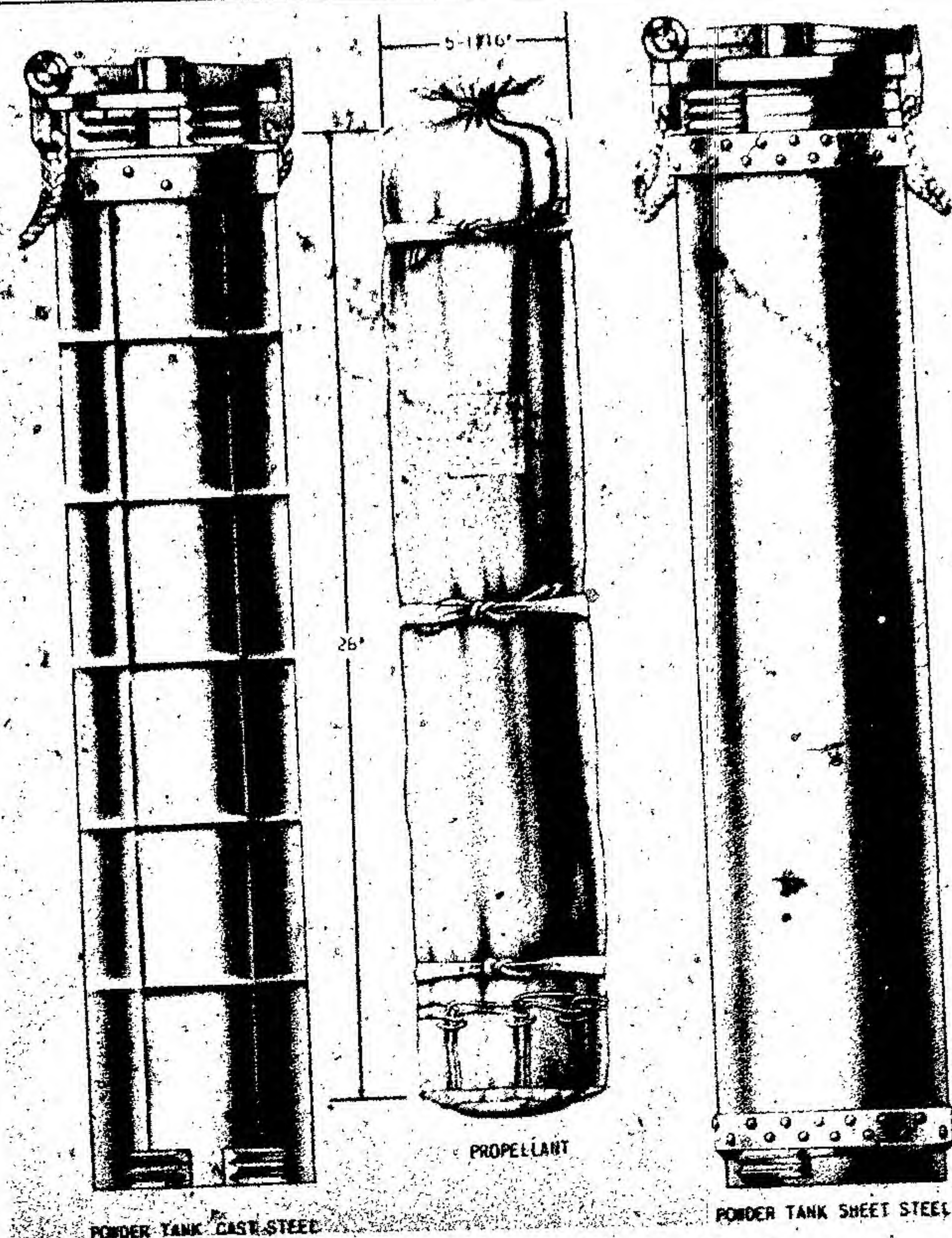


Figure 399—14-cm Propellant and Tanks.

14-cm (140-mm) (5.5-inch) Propellant and Tanks

Powder tanks:

For storage purposes, the propellant charges are sealed in waterproof containers commonly known as "powder tanks." Two types of the tanks have been recovered: one is a heavy tank (26.4 pounds) of cast steel and bronze; the other is sheet steel and aluminum and weighs 15.4 pounds. Both are well lacquered inside and have the same internal dimensions, 6.2 inches by 33.4 inches.

Propellant: 37 C: 24.51 pounds (11.14 kg.).

Unperforated cylindrical sticks approximately 3.7 mm (0.15 inch) by 28 inches graphited double-base powder.

The propellant sticks are enclosed in a bag of heavy brownish silk.

An ignition pad containing 17.2 grams of granular black powder is laced onto the base of the charge.

Primer: Mk 2 lock percussion primer.

Weapon in which used: Type 3d year 14-cm/50 gun. (low angle).

This is a pedestal-mounted deck gun employing bag ammunition. It is commonly found in shore emplacements for coastal defense and limited antiaircraft use. Strongly resembling the type 3d year 12-cm/45 gun in design, this weapon also has three recoil cylinders all mounted above the tube and an interrupted thread breech block hinged on the right. This gun has been found both with a splinter shield attached, and without.

14-cm (140-mm) (5.5-Inch) High-Explosive Projectile

Weight of filled projectile (without fuze): 82.7 pounds.

Weight of empty projectile: 74.43 pounds.

Weight stamped on rotating band (sample): No data (varies with individual projectile).

Length of projectile (without fuze, with adapter): 21.02 inches.

Length of projectile (without fuze or adapter): 19.75 inches.

Diameter at bourrelet: 5.49 inches (139.5 mm).

Distance from base to rotating band: 0.60 inch.

Width of rotating band: 1.60 inches.

Radius of ogive: 5 cal.

Filling: Cast picric acid (shimose): 7.9 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed container, encased in a heavy cotton-flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 5th year point detonating fuze.

Removal of the adapter does not permit alternate fuzing, because the lower threaded portion of the adapter is larger than any known fuze.

Weapon in which used: Type 3d year 14-cm/50 gun (low angle).

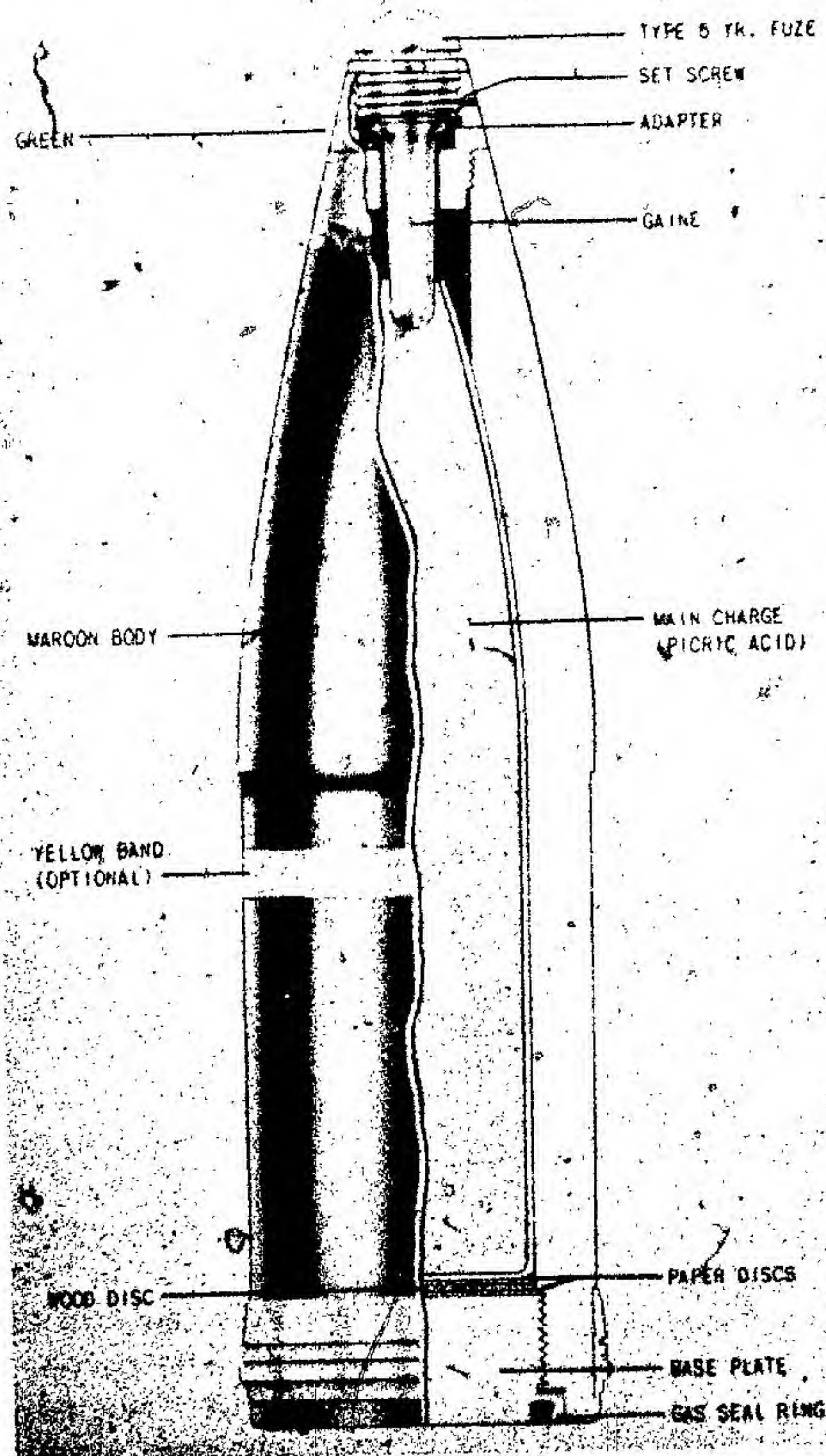


Figure 400—14-cm High-Explosive.

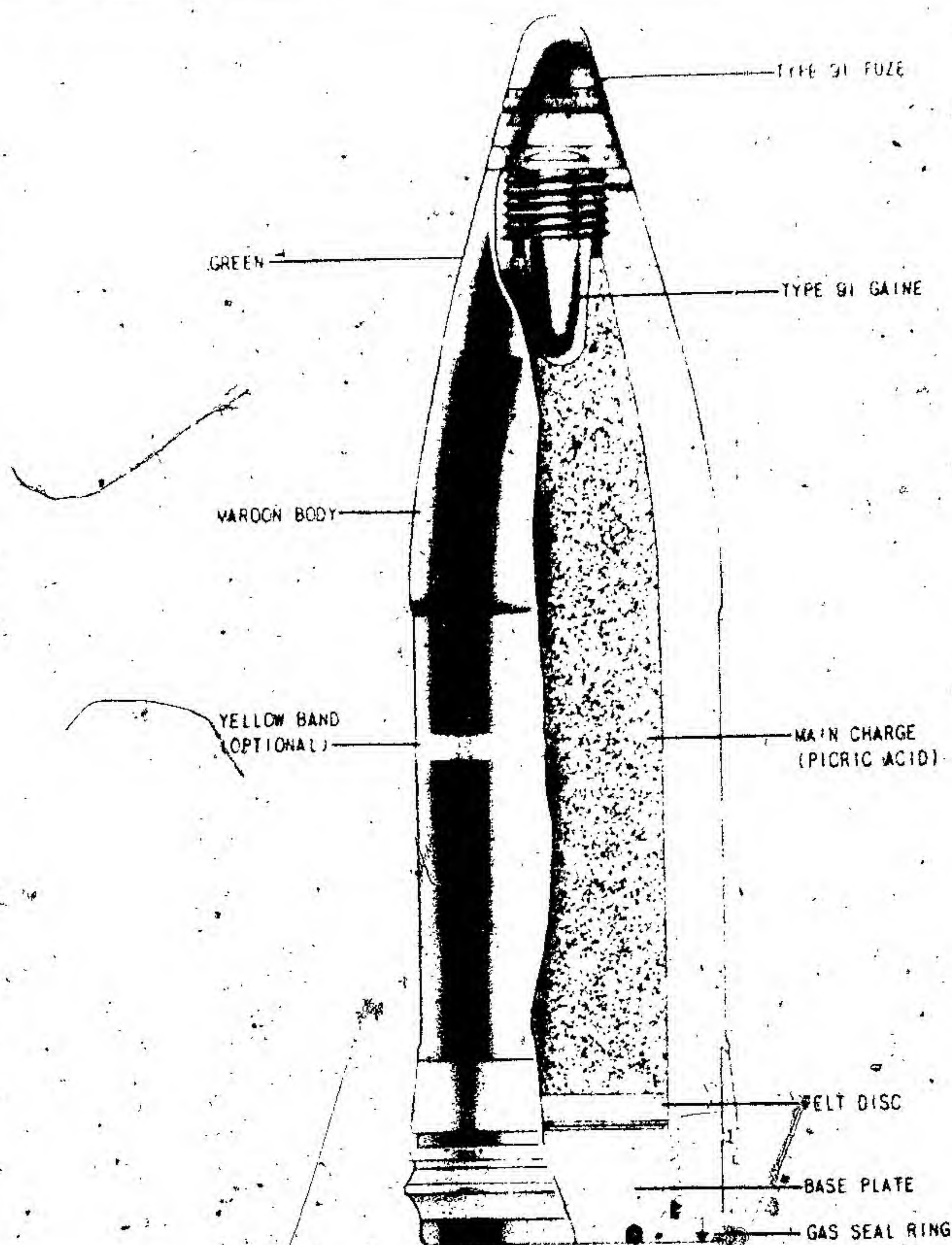


Figure 401—14-cm (Ordinary Type 0) High-Explosive.

(Type 0 Ordinary) 14-cm (140-mm) (5.5-inch) High-Explosive Projectile

Weight of filled projectile (without fuze): 88.22 pounds.

Weight of empty projectile: 81.62 pounds.

Weight stamped on rotating band (sample): 34.100 kg. (varies with individual projectiles).

Length of projectile (without fuze): 21.55 inches.

Diameter at bourrelet: 5.49 inches (139.5 mm).

Distance from base to rotating band: 0.59 inch.

Width of rotating band:

Forward: 1.11 inches.

Space: 0.38 inch.

Aft: 1.09 inches.

Radius of ogive: No data.

Filling: Cast picric acid (shimose): 6.60 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed-paper container, encased in a heavy cotton-flannel bag and sealed in the projectile with paraffin.

Fuzing:

Type 91 mechanical time fuze.

Type 88 point detonating fuze.

Weapon in which used: Type 3d year. 14-cm/50 gun (low angle).

Remarks: This projectile permits the 14 cm/50 gun to be used for antiaircraft fire, but the angle of elevation of the weapon definitely limits its effectiveness.

(Ordinary Mk 1) 14-cm (140-mm) (5.5-inch)
Common Projectile

Weight of filled projectile (with fuze): 83.82 pounds.

Weight of empty projectile: 77.88 pounds.

Weight stamped on rotating band (sample): 34.300 kg. (varies with individual projectiles).

Length of projectile: 21.70 inches.

Diameter at bourrelet: 5.49 inches (139.5 mm).

Distance from base to rotating band: 0.59 inch.

Width of rotating band:

Forward: 1.11 inches.

Space: 0.38 inch.

Aft: 1.09 inches.

Radius of ogive: No data.

Filling: Cast picric acid (shimose): 5.94 pounds.

The charge consists of two blocks of explosive cast and sealed in waxed-paper containers encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 13th year Mk 1 Mod 1 base fuse.

Weapon in which used: Type 3d year. 14-cm/50 gun.

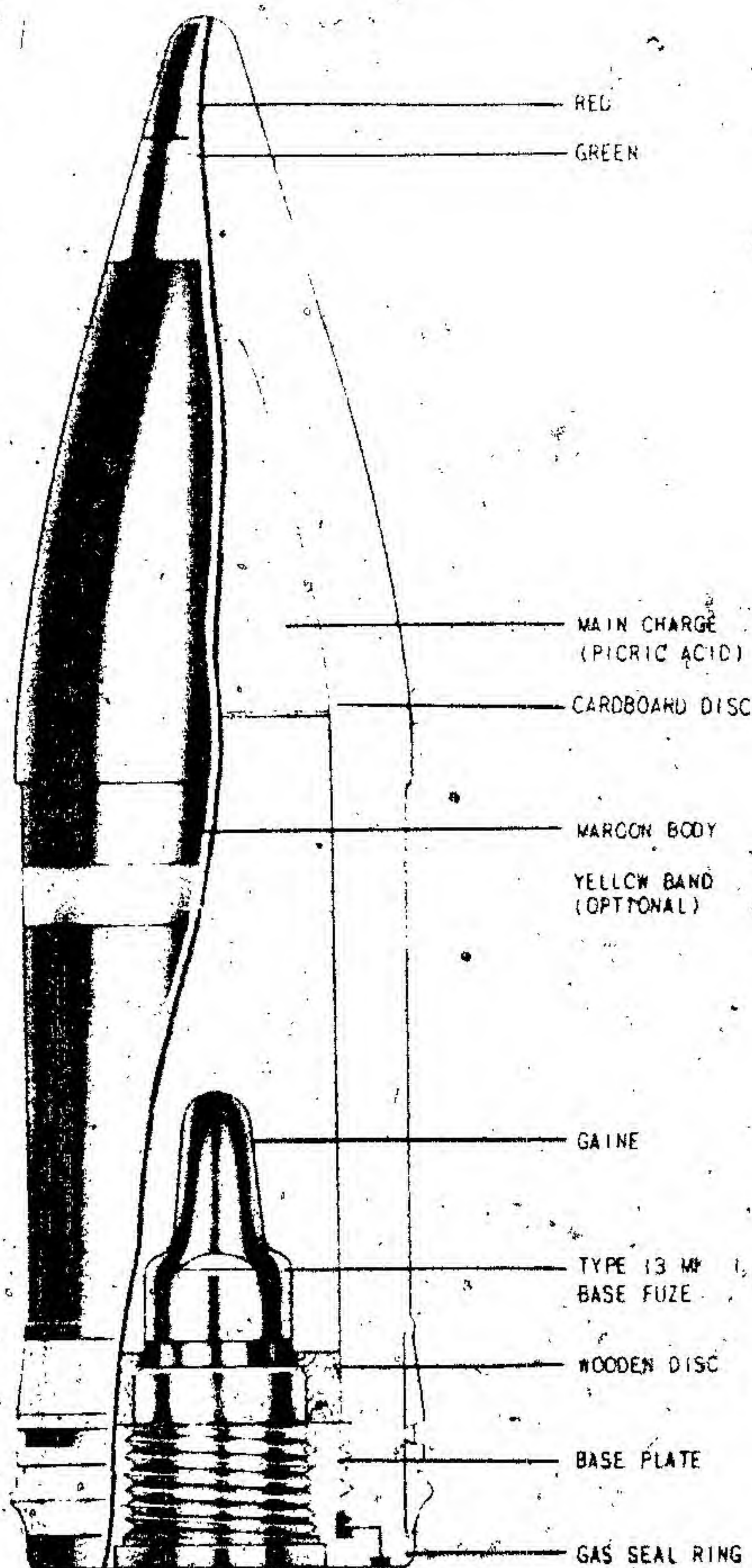


Figure 402—14-cm (Ordinary Mk 1) Common.

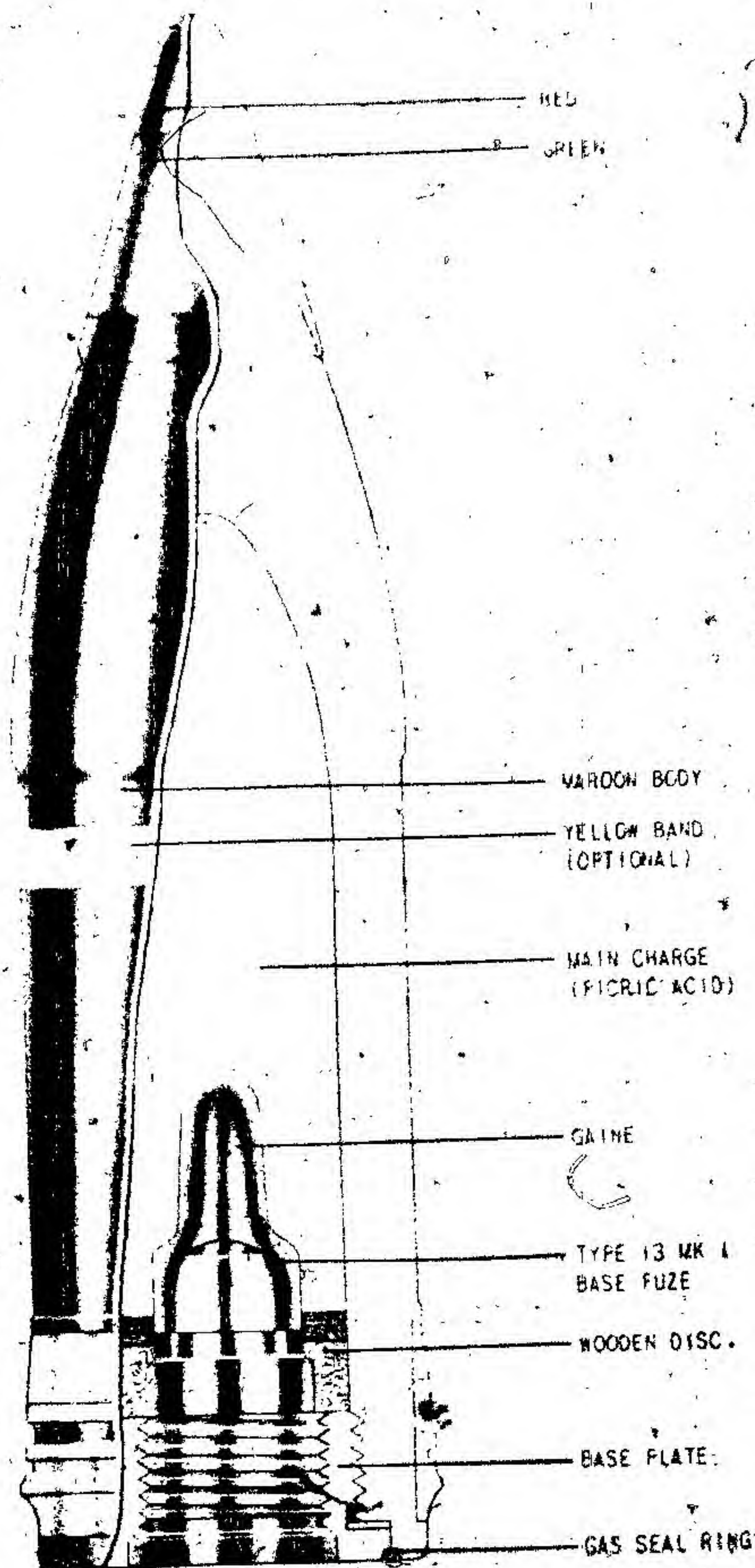


Figure 403—14-cm (Ordinary Mod 1) Common Capped.

**(Ordinary Mod 1) 14-cm (140-mm) (5.5-Inch)
Common Capped**

Weight of filled projectile (with fuze): 84.94 pounds.

Weight of empty projectile: 80.14 pounds.

Weight stamped on rotating band (sample):
35.800 kg. (varies with individual projectiles).

Length of projectile: 21.63 inches.

Diameter at bourrelet: 5.49 inches (139.5 mm).

Distance from base to rotating band: 0.593 inch.

Width of rotating band:

Forward: 1.11 inches.

Space: 0.38 inches.

Aft: 1.09 inches.

Radius of ogive: Not determined.

Filling: Cast picric acid (shimose): 4.80 pounds.

The charge consists of a single block of explosive cast and sealed in a waxed-paper container, encased in a heavy cotton flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 13th year Mk 1 Mod 1 base detonating.

Weapon in which used: Type 3d year 14-cm/50 gun.

14-cm (140-mm) (5.5-Inch) Illuminating Projectile

Weight of filled projectile (without fuze): 87.5 pounds.

Weight of empty projectile: 67.46 pounds (approximate).

Weight stamped on rotating band (sample): No data (varies with individual projectiles).

Length of projectile (without fuze): 20.3 inches.

Diameter at bourrelet: 5.49 inches (139.5 mm).

Distance from base to rotating band: 0.59 inch.

Width of rotating band:

Forward: 1.11 inches

Space: 0.38 inch.

Aft: 1.09 inches.

Radius of ogive: No data.

Filling:

Primary ejection charge (black powder): 100 grams.

Secondary ejection charge (black powder): 41 grams.

Initiating pellet, relay train, and delay are black powder.

The ignition compound for the illuminant is a mixture of potassium nitrate, iron oxide, aluminum, sulphur, and wax.

The illuminant is a mixture of barium nitrate, magnesium, and wax.

Weight: 31 pounds.

Fuzing: Type 91 mechanical time fuze.

Weapon in which used: Type 3d year 14-cm/50 gun.

Operation: At the end of the time set, the mechanical time fuze fires the initiating pellet. The relay train transmits the flash to the base of the primary ejection charge container and ignites the charge. The primary ejection charge expels the canister containing the illuminating charge and its parachute, and also ignites the delay element. A short time after the canister is ejected from the projectile body, the delay element fires the secondary ejection charge which expels the illuminating charge and parachutes and ignites the illuminant. Two parachutes, a large one above a small one, suspend the illuminating unit.

Burning time, not determined.

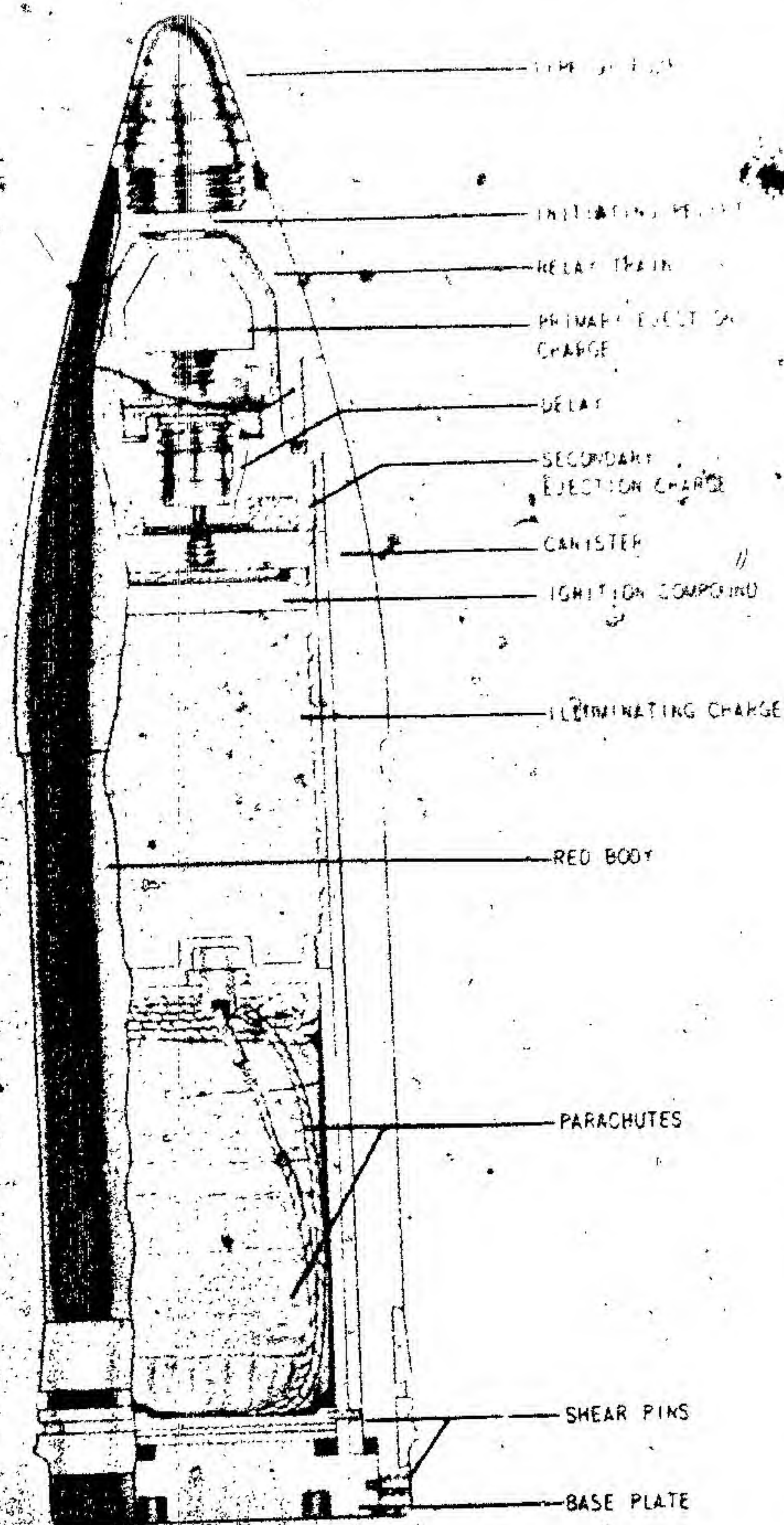


Figure 404—14-cm Illuminating.

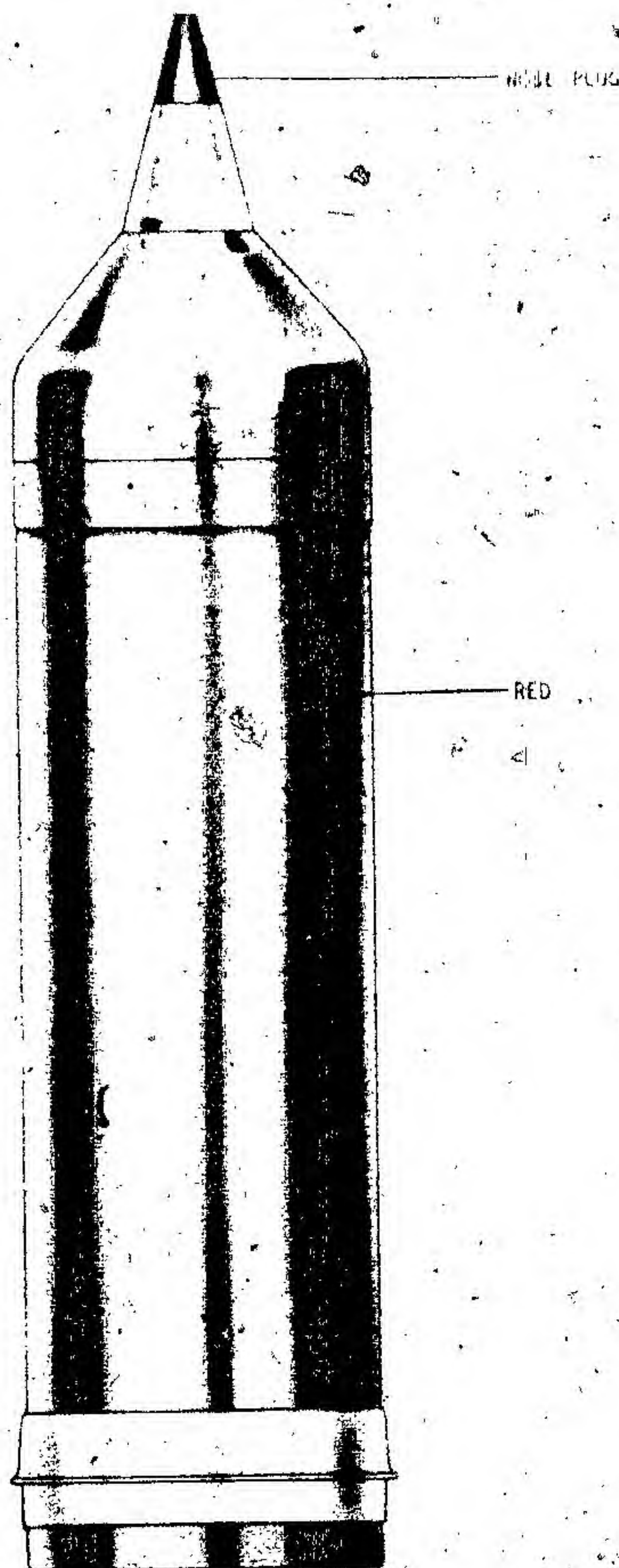


Figure 405—14-cm Smoke.

14-cm (140-mm) (5.5-Inch) Smoke Projectile

Weight of filled projectile (without fuze): 68.80 pounds.

Weight of empty projectile: No data.

Weight stamped on rotating band (sample): No data (varies with individual projectiles).

Length of projectile (without fuze): 20.63 inches.

Diameter at bourrelet: 5.49 inches (139.5 mm).

Distance from base to rotating band: 0.65 inch.

Width of rotating band: 1.56 inches.

Filling: Presumably white phosphorus.

Fuzing: Probably type 98 mechanical time fuze.

Weapon in which used: Type 3d year 14-cm/50 gun.

14-cm (140-mm) (5.5-Inch) Cartridge Case (Semifixed)

Case:

Length: 21.67 inches.
Diameter of base: 7.00 inches.
Material: Brass.
Weight (empty): 17.0 pounds.

Propellant:

30 DC (type 13 propellant): 6.860 kg.
Unperforated cylindrical sticks, approximately 3 mm ($\frac{1}{8}$ inch) by 501 mm (19 $\frac{1}{4}$ inch) of graphited double-base powder.

The propellant sticks are enclosed in a bag of heavy brownish silk.

Primer: No data.

Weapon in which used: Not known.

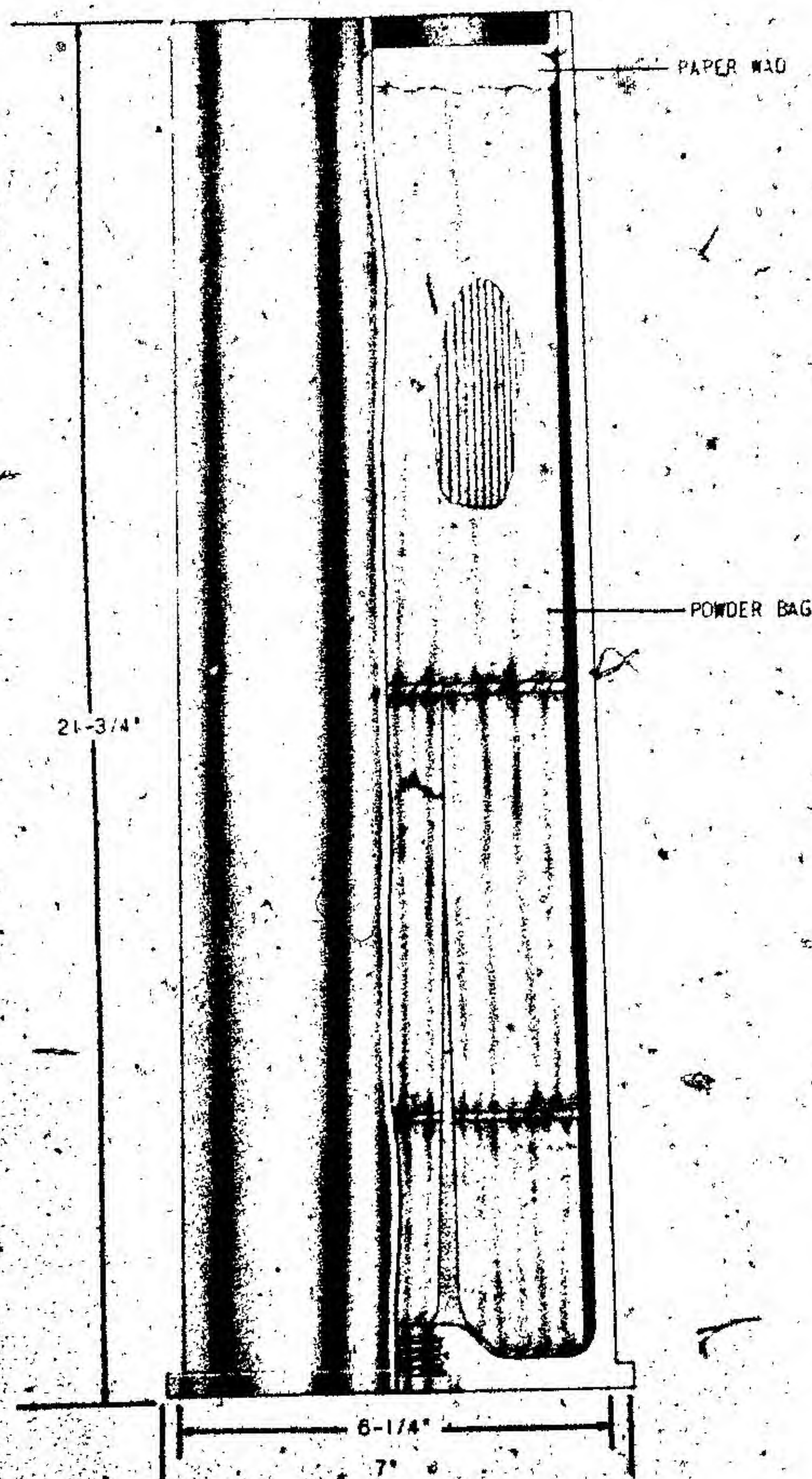
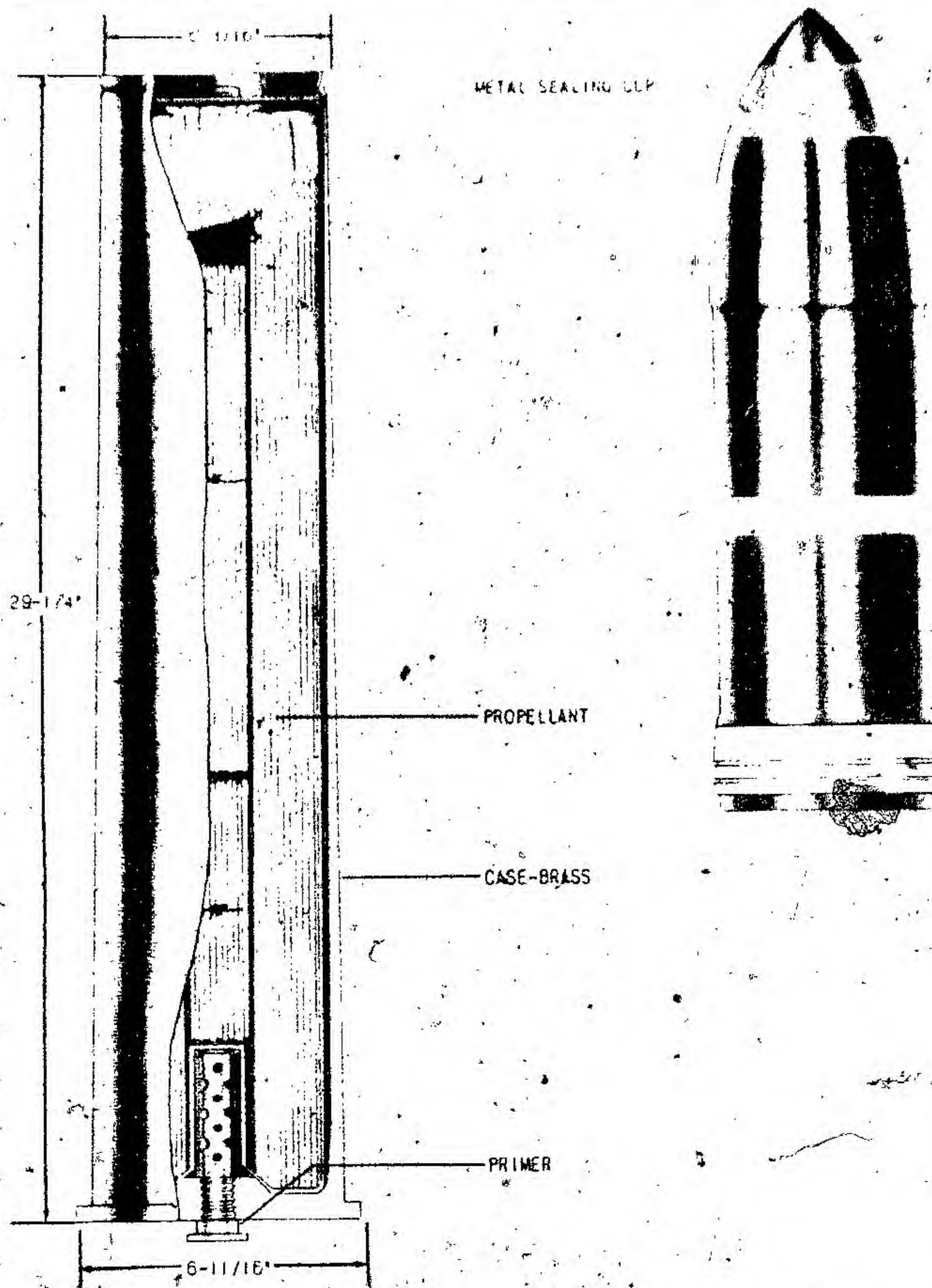


Figure 406—14-cm Cartridge Case (Semifixed).



15-cm (152-mm) (6-Inch) Complete Round (Semifixed)

Case:

Length: 29.25 inches.

Diameter of base: 6.69 inches.

Material: Brass.

Weight (empty): 27.0 pounds.

Propellant:

37 DC 18.94 pounds (8.140 kg.).

Unperforated cylindrical sticks approximately $\frac{1}{8}$ in. by 26 in. of graphited double-base powder

The propellant sticks are enclosed in a bag

Figure 407—15-cm Complete Round (Semifixed).

of heavy brownish silk.

Primer: Mk 1 case percussion primer Model 4.

Weapon in which used: Type 41 (Meiji) 15 cm, 40 gun (low angle).

This, like many other Japanese Navy guns, is a copy of a British design, and guns manufactured by Armstrong-Whitworth have been found emplaced together with pieces of Japanese manufacture. It is a pedestal-mounted deck gun, commonly found with a partially enclosing splinter shield attached. The breech block is an interrupted thread plug, mounted to swing to the right.

14-cm (152-mm) (6-Inch) Common (Ordinary Mod 1)

Weight of filled projectile: No data.

Weight of empty projectile: No data.

Weight stamped on rotating band (sample):

39.62 kg. (varies with individual projectiles).

Length of projectile: 22.50 inches.

Diameter at bourrelet: 5.98 inches (152.0 mm).

Distance from base to rotating band: 0.66 inches

Width of rotating band: 1.75 inches.

Radius of ogive: 2 cal.

Filling:

Cast picric acid (shimose): No data.

The charge consists of a block of explosive

cast and sealed in a waxed-paper container, encased in a heavy cotton-flannel bag and sealed in the projectile with paraffin.

Fuzing: Type 13th-year Mk 1 base fuze.

Weapon in which used: Type 41 (Meiji) 15-cm/40 gun or the British prototype.

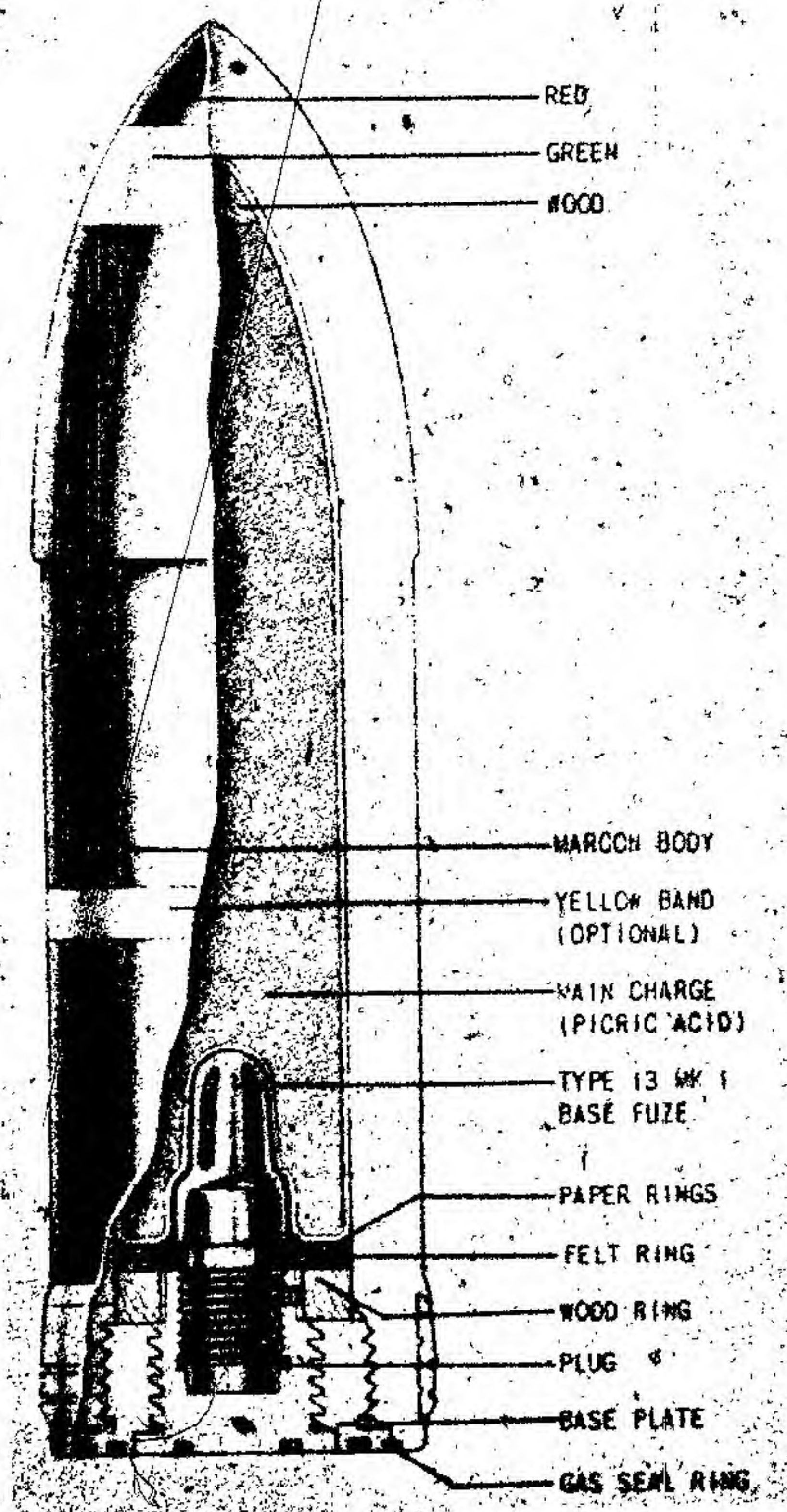
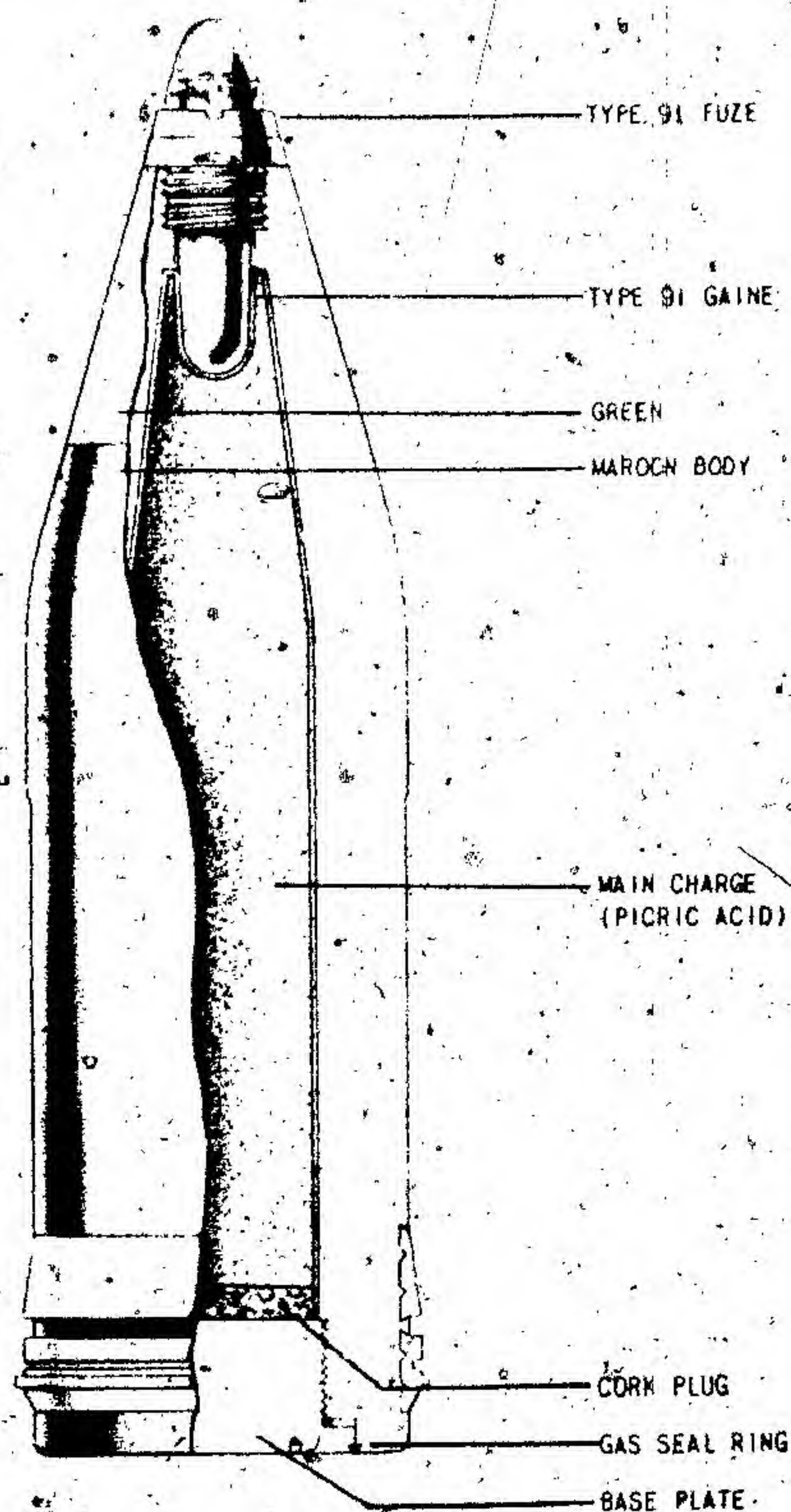


Figure 408—15-cm (Ordinary Mod 1) Common.



**Figure 409—15-cm (Ordinary Type 0) High-Explosive,
(Ordinary Type 0) 15-cm (152-mm) (6-inch)
High-Explosive**

Weight of filled projectile (without fuze): 97.59 pounds.

Weight of empty projectile: 90.82 pounds.

Weight, stamped on rotating band (sample): 41.28 kg. (varies with individual projectiles).

Length of projectile (without fuze): 20.0 inches.

Diameter at bourrelet: 6.0 inches (152 mm).

Distance from base to rotating band: 0.7 inch.

Width of rotating band:

Forward: 1.2 inches.

Space: No data.

Aft: 1.2 inches.

Radius of ogive: 4 cal.

Filling: Cast picric acid (shimose): 6.8 pounds.

The charge is made into a waxed-paper-wrapped preformed block with a well in the nose to receive the gaine.

Fuzing: Type 88 nose fuzes.

Weapons in which used:

15 cm/40 gun (bag).

15 cm/45 gun (bag).

15 cm/50 gun (bag).

(Ordinary Mk 4) 15-cm (152-mm) (6-inch)
Common

Weight of filled projectile (without fuze): 97.8 pounds.

Weight of empty projectile: 91.9 pounds.

Weight stamped on rotating band: 41.78 kg.
(varies with individual projectiles).

Length of projectile: 22.5 inches.

Diameter at bourrelet: 6.0 inches (152 mm).

Distance from base to rotating band: 0.7 inch.

Width of rotating band:

Forward: 1.2 inches.

Space: No data.

Aft: 1.2 inches.

Radius of ogive: 4 cal.

Filling: Cast picric acid (shimose): 5.9 pounds.

The charge is made in two waxed-paper-

wrapped preformed blocks enclosed in a cotton-flannel bag.

Fuzing: Type 13 Mk 1 Mod 1 base fuze.

Weapon in which used:

15 cm/40 gun (bag).

15 cm/45 gun (bag).

15 cm/50 gun (bag).

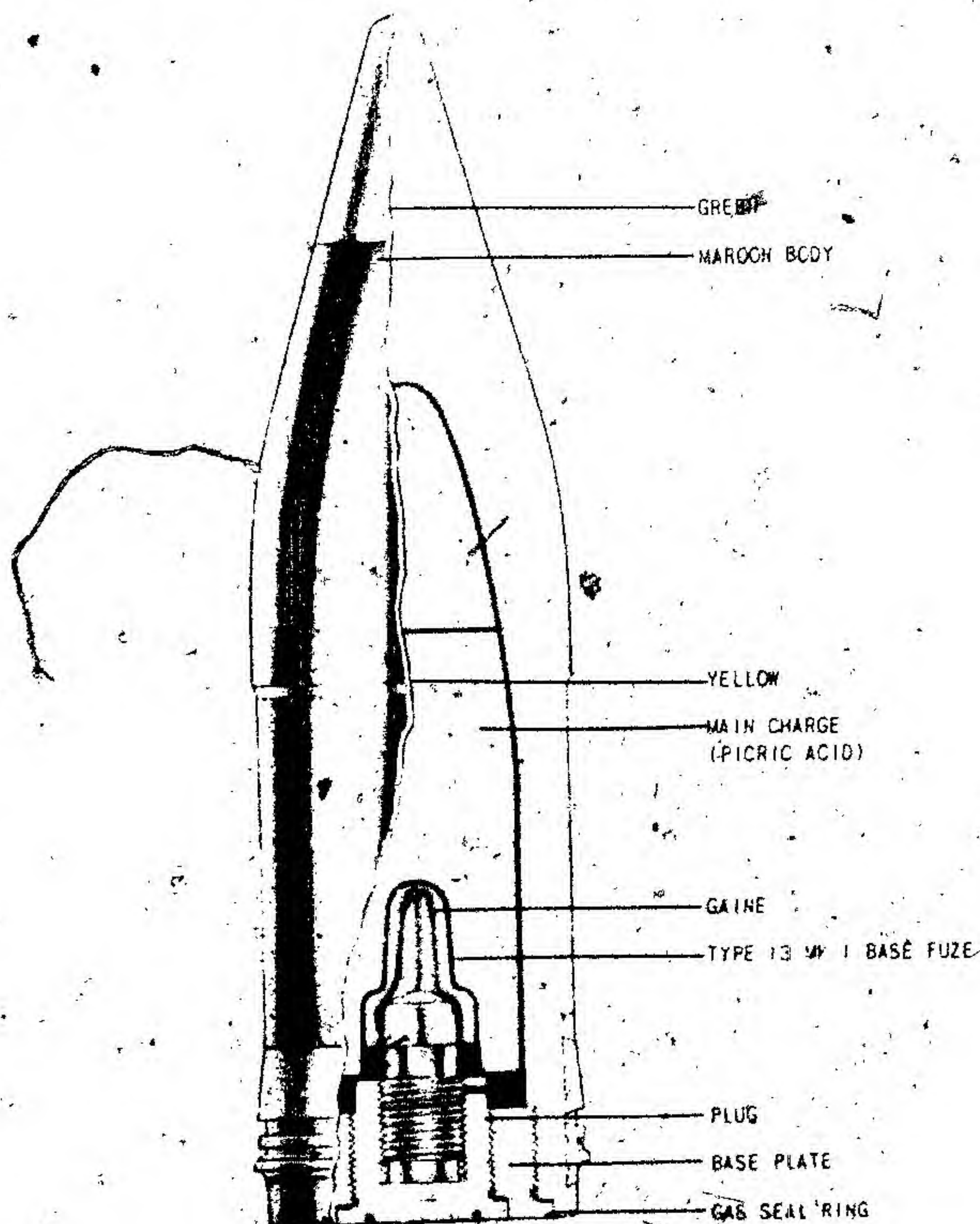


Figure 410—15-cm (Ordinary Mk 4) Common.

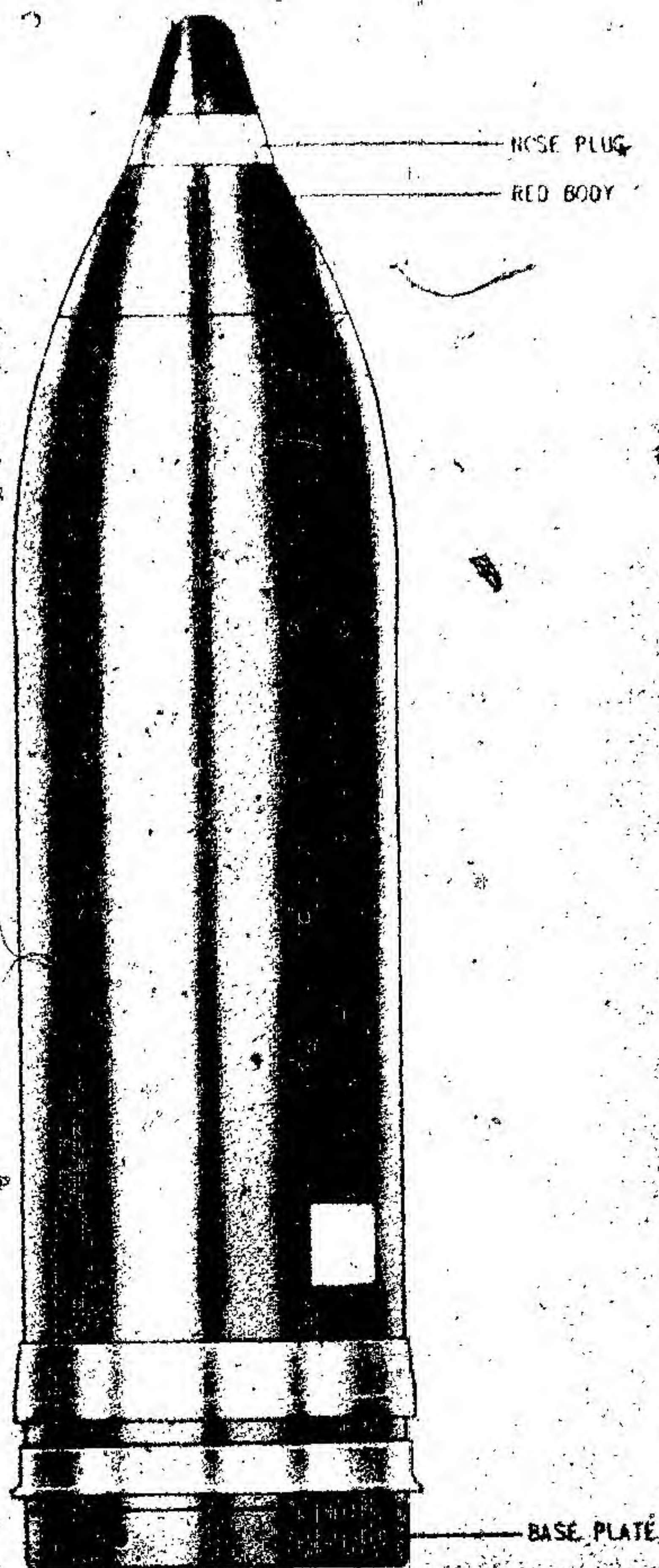


Figure 411—15-cm Incendiary Shrapnel.

15-cm (152-mm (6-inch) Incendiary-Shrapnel

Weight of filled projectile (without fuze): 98.75 pounds.

Weight of empty projectile: No data.

Weight stamped on rotating band (sample): 41.32 kg. (varies with individual projectiles).

Length of projectile (without fuze): 21.00 inches.

Diameter at bourrelet: 6.00 inches (152 mm).

Distance from base to rotating band: 0.687 inch.

Width of rotating band: 2.703 inches.

Fuzing:

Type 91 mechanical time fuze.

Type 88 mechanical point detonating fuze.

Filling: No data.

Weapon in which used:

15 cm/40 gun (bag).

15 cm/45 gun (bag).

15 cm/50 gun (bag).

15-cm (152-mm) (6-inch) Practice Projectile

Weight of projectile, empty: No data.

Weight stamped on rotating band: 100 pounds
(varies with individual projectiles).

Length of projectile: 22.47 inches.

Diameter at bourrelet: 60 inches (152 mm).

Distance from base to rotating band: 0.7 inch.

Width of rotating band:

Forward: 1.2 inches.

Space: No data.

Aft: 1.2 inches.

Radius of ogive: 4 cal.

Filling:

The projectile from which this information was obtained was recovered empty.

Japanese Navy practice rounds have been recovered filled with sand and iron filings.

Weapons in which used:

15 cm/40 gun (bag).

15 cm/45 gun (bag).

15 cm/50 gun (bag).

Remarks: This projectile has the same external appearance and dimensions as the Mk 4 common projectile. It differs in that the cavity is smaller, and the walls are thicker.

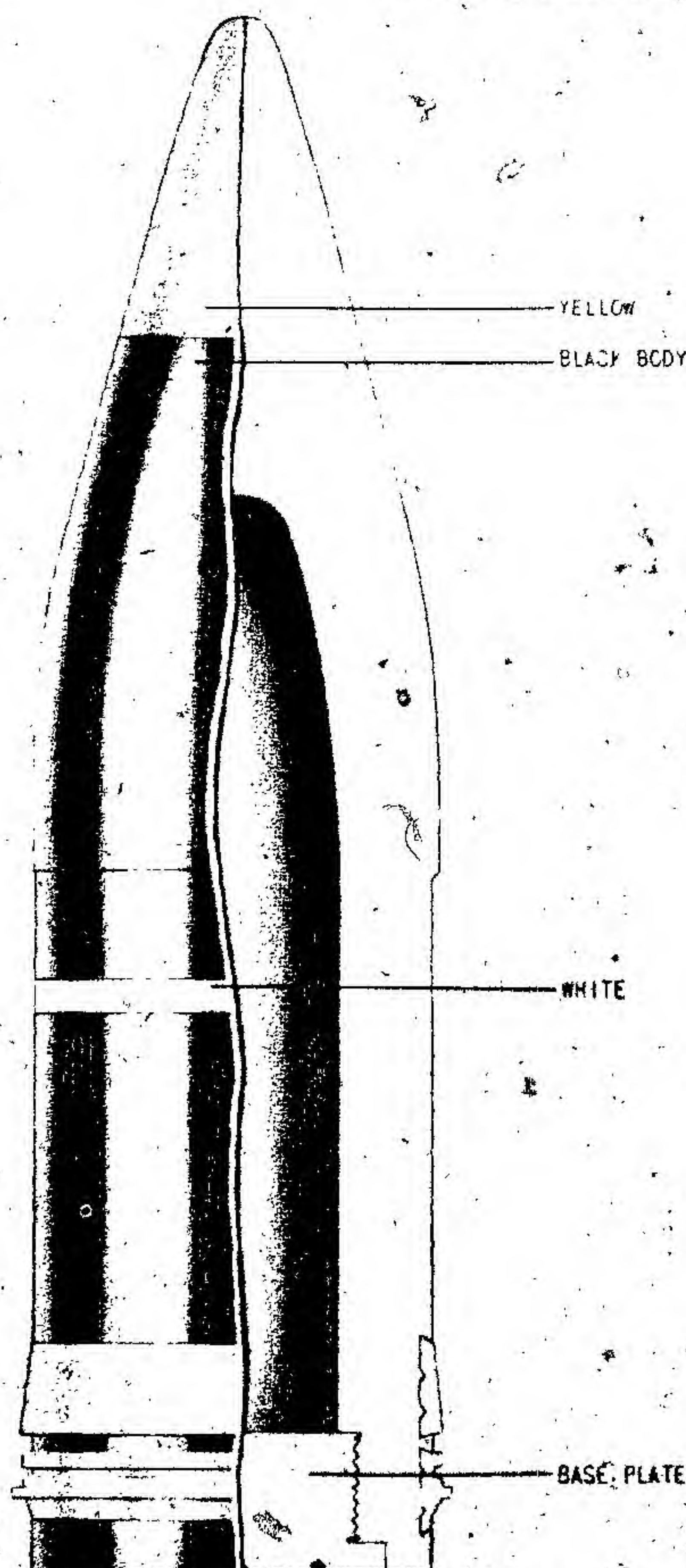


Figure 412—15-cm Practice.

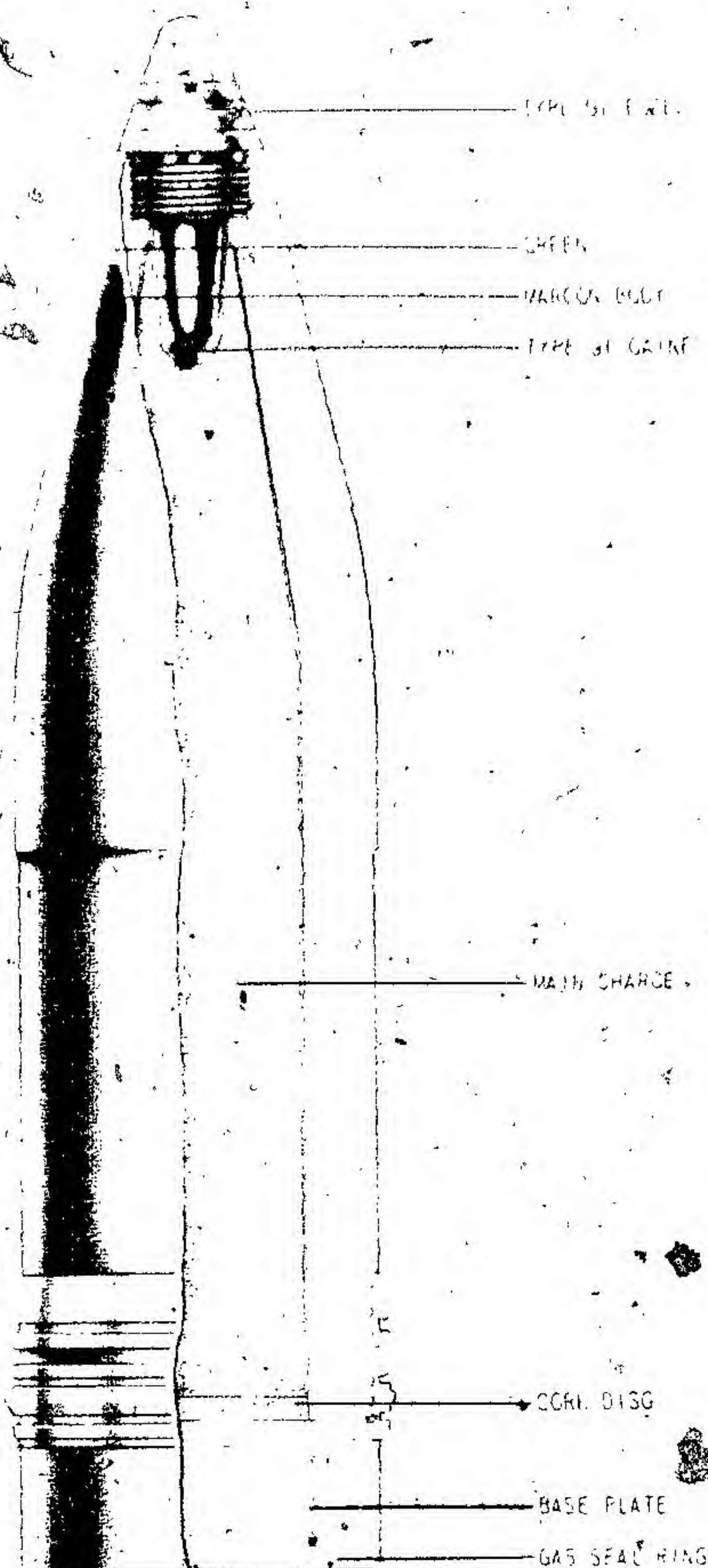


Figure 413—15.5-cm (Ordinary Type 0) High-Explosive.

**(Ordinary Type 0) 15.5-cm (155-mm)
(6.1-Inch) High-Explosive**

Weight of filled projectile (without fuze): 419.3 pounds.

Weight of empty projectile: 412.8 pounds.

Weight stamped on rotating band (sample): 51.28 kg. (varies with individual projectile).

Length of projectile (without fuze): 23.31 inches.

Diameter at bourrelet: 6.09 inches (154.5 mm).

Distance from base to rotating band: 2.36 inches.

Width of rotating band:

Forward: 1.26 inches.

Space: 0.24 inch.

Aft: 1.26 inches.

Radius of ogive: 4 cal.

Filling:

Cast picric acid (shimose): 7.5 pounds.

The charge consists of two waxed, paper-wrapped preformed blocks with a well in the upper block to receive the gain. The two blocks are enclosed in a cotton-flannel bag.

Fuzing: Type 88 point detonating fuzes.

Weapon in which used 15.5 cm. gun (bag).

Type 91 15.5-cm (155-mm) (6.1-inch) Armor-Piercing

Weight of filled projectile: No data.

Weight of empty projectile: 115.92 lb.

Weight stamped on rotating band: 52.69 kg. Filling:
(varies with individual projectiles).

Length of projectile: 27.09 inches.

Diameter at bourrelet: 6.08 inches (154.5 mm).

Distance from base to rotating band: 2.36 inches.

Width of rotating band:

Forward: 1.26 inches.

Space: No data.

Aft: 1.26 inches.

Radius of ogive: No data.

Trinitroanisole: 6.84 pounds.

The charge is made into one paper-wrapped preformed block with a well in the base to receive the fuze gaine. The charge is surrounded by a $\frac{3}{16}$ in. layer of cork-like plastic material which serves as a shock absorber.

Fuzing: Type 13-year Mk 1 Mod 1.

Weapon in which used: 15.5-cm. gun (bag).

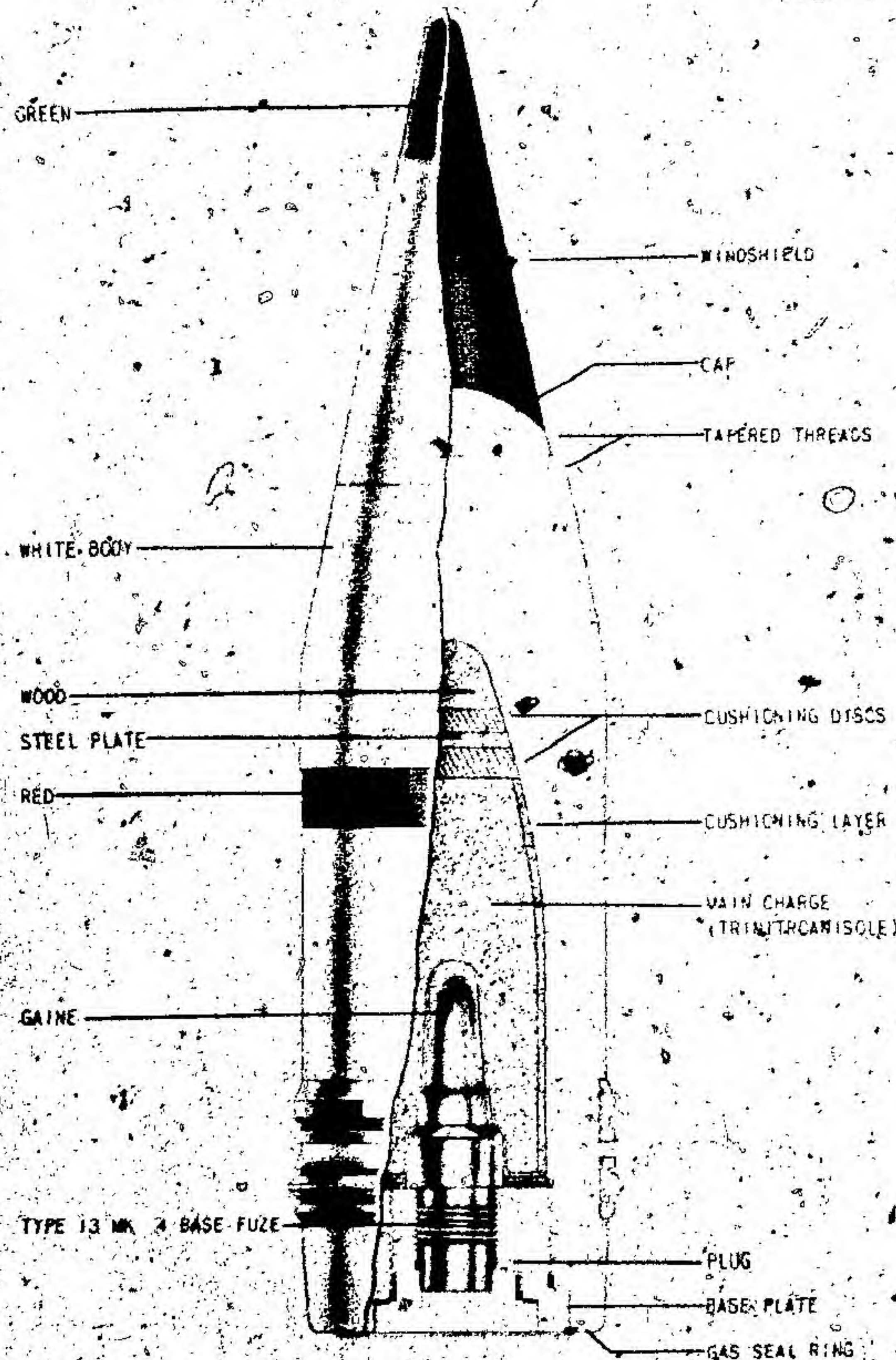


Figure 414—15.5-cm Armor-Piercing Type 91.

JAPANESE EXPLOSIVE ORDNANCE

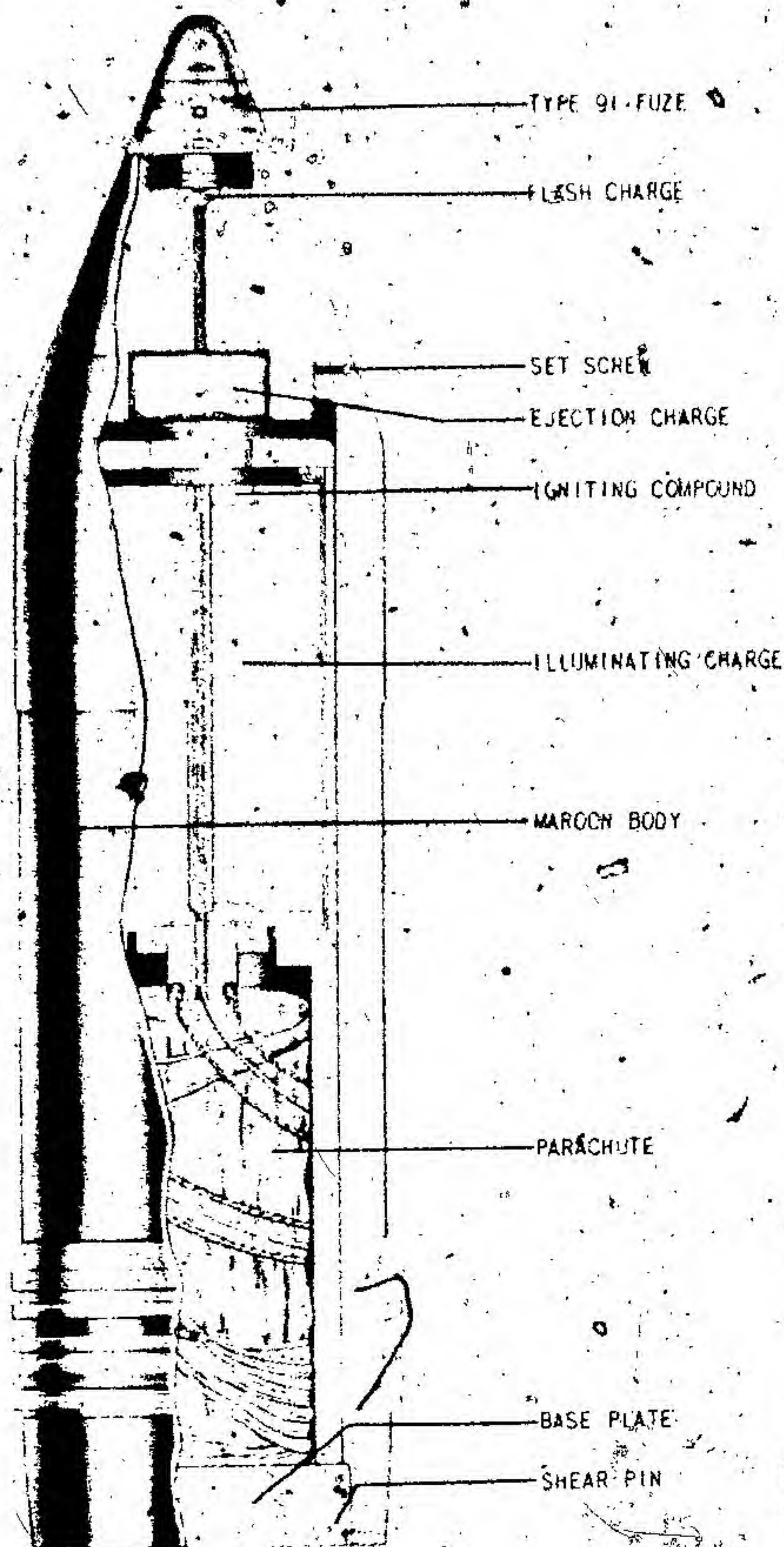


Figure 415—15.5-cm Illuminating.

15.5-cm (155-mm) (6.1-inch) Illuminating

Weight of filled projectile (without fuze): No data.

Weight of empty projectile: 111.19 pounds.

Weight stamped on rotating band: 111.19 pounds (varies with individual projectiles).

Length of projectile (without fuze): 25.29 inches.

Diameter at bourrelet: 6.08 inches (154.5 mm).

Distance from base to rotating band: 2.36 inches.

Width of rotating band:

Forward: 1.26 inches.

Space: No data.

Aft: 1.26 inches.

Radius of ogive: No data.

Filling:

A flash charge, an ejection charge (80 grams) and a thin layer of igniting composition are black powder.

The illuminating element is presumed to be the typical Japanese illuminant consisting of a mixture of barium nitrate, magnesium, and wax.

Fuzing: Type 91, mechanical time fuze.

Weapon in which used: 15.5-cm gun (bag).

Operation: The functioning of the projectile is as follows:

1. The time fuze functions, igniting the flash charge.

2. The flash charge, in turn, ignites the ejection charge, which expels from the base of the projectile the upper and lower split canisters containing, respectively, the illuminating charge and the supporting parachute.

3. Simultaneously the ejection charge ignites the illuminating charge. The burning time is 45 seconds.

20-cm/Short (202-mm) (8-inch) Complete Round (Semifixed)

Case:

Length: 11.0 inches.

Diameter of base: 9.56 inches.

Material: Brass.

Weight (empty): 18.49 pounds.

Propellant:

10 C3 (type 89 propellant): 4.4 pounds (2.0 kg.).

Unperforated cylindrical sticks, approximately 1 mm ($\frac{1}{32}$ inch) by 8 $\frac{1}{2}$ –9 inches, amber-colored double-base powder.

The propellant sticks are enclosed in two compartmented bags of heavy brownish silk. The inner bag contains 0.960 kg. (2.1 pounds) of propellant. The outer bag contains 1.040 kg. (2.3 pounds) of propellant.

Primer: Mk 1 case percussion primer Model 4.

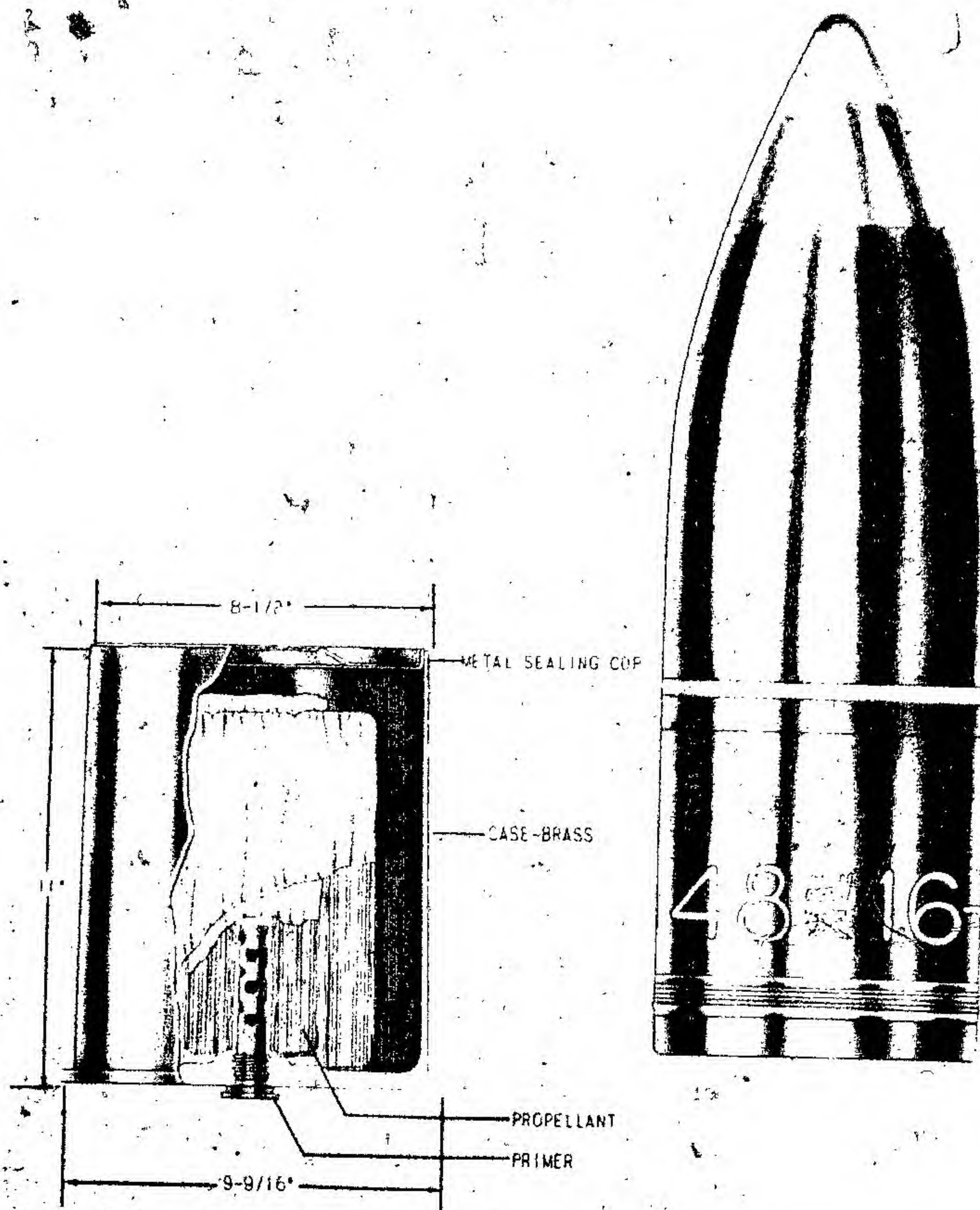


Figure 416—20-cm Short Complete Round (Semifixed).

Weapon on which used:

Short 20 cm gun.

This is a short-barreled (12 cal.) gun of low muzzle velocity and light construction on a pedestal mount designed originally for use on the light decks of merchant ships. The purpose of this weapon is to deliver a relatively heavy projectile at a limited range for anti-submarine attack and to throw up low-level antiaircraft barrage.

This gun fires semifixed ammunition; the breechblock is of the interrupted-thread type. It has been found mounted in shore emplacements.

JAPANESE EXPLOSIVE ORDNANCE

(Ordinary Mk 1) 20-cm/Short (202-mm) (8-Inch) High-Explosive

Weight of filled projectile (without fuze): 111.0 pounds.
 Weight of empty projectile: 72.50 pounds.
 Weight stamped on rotating band (sample): 32.42 kg. (varies with individual projectiles).
 Length of projectile (without fuze): 21.94 inches.
 Diameter at bourrelet: 7.94 inches (201.5 mm).
 Distance from base to rotating band: 1.0 inch.

Width of rotating band: 1.0 inch.

Filling:

Tritroanisole (type 91, explosive): 28.50 pounds.

The charge consists of three blocks of explosive cast and sealed in a waxed paper container and sealed in the projectile with paraffin.

Fuzing:

Type 0 mechanical time fuze.

Type 88 Mod. 4 point detonating fuze.

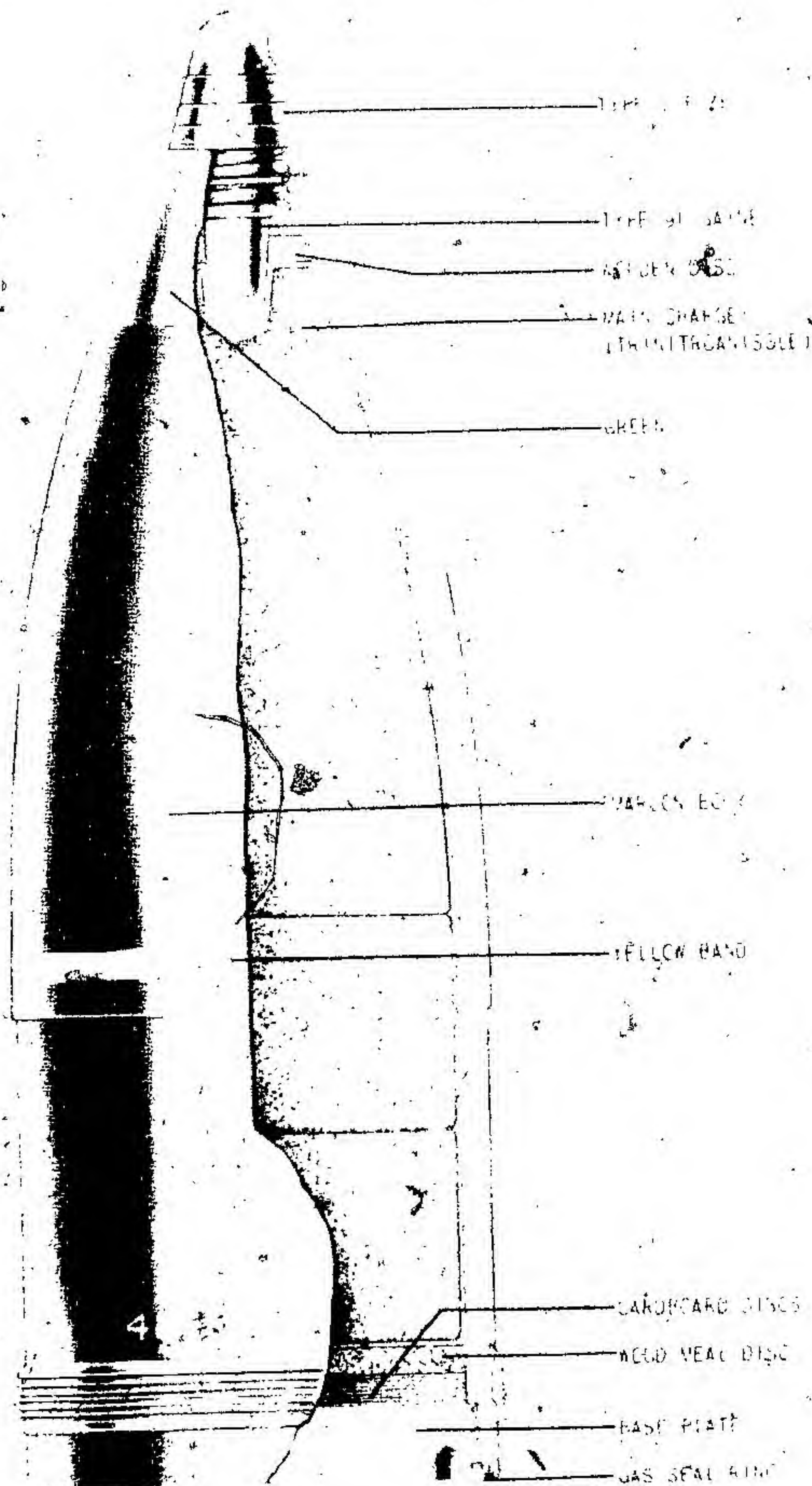


Figure 417—20-cm Short (Ordinary Mk 1) High-Explosive.

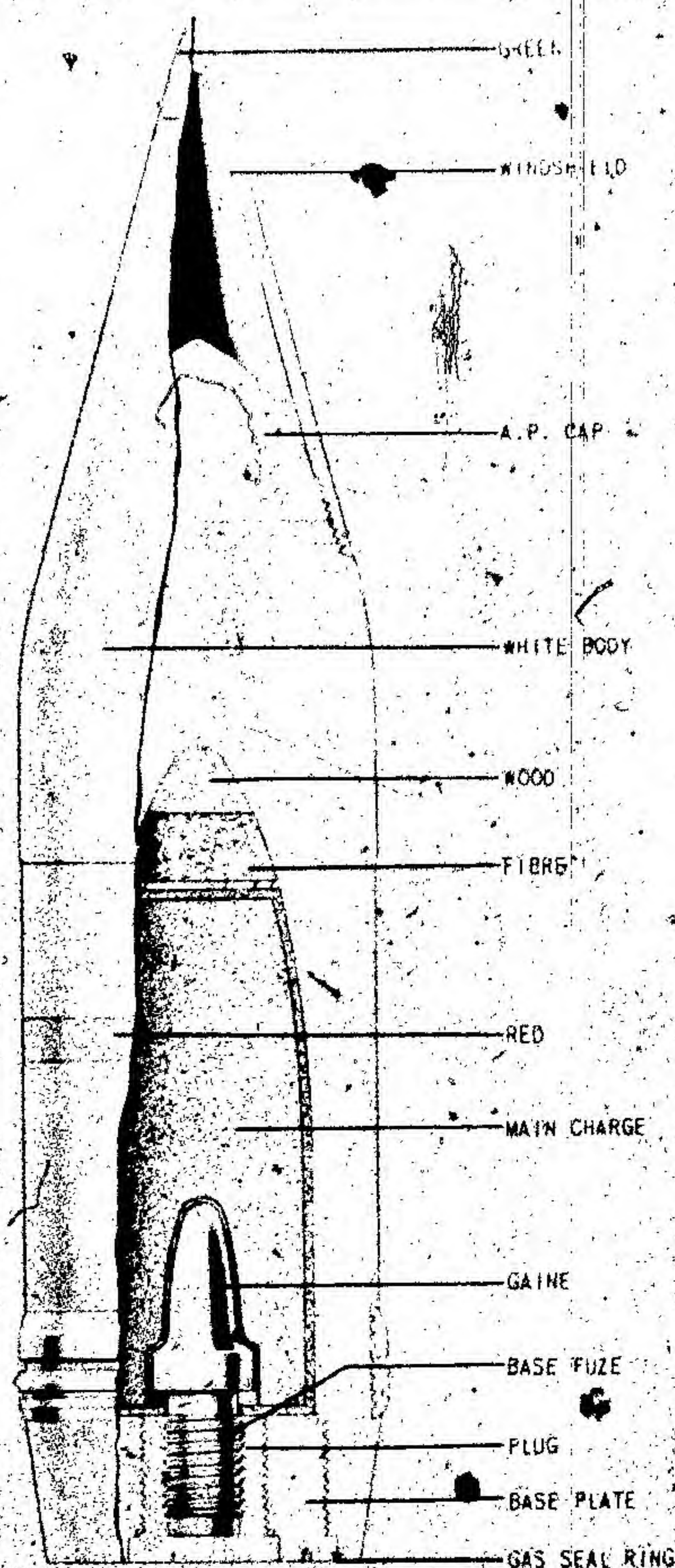


Figure 418—20-cm (Armor-Piercing Type 91) Armor-Piercing.

Type 91 20-cm (202-mm) (8-Inch) Armor-Piercing

Weight of filled projectile: 276.76 pounds.

Weight of empty projectile: 259.6 pounds.

Weight stamped on rotating band (sample):
118.8 kg. (varies with individual projectiles).

Length of projectile: 35.86 inches.

Diameter at bourrelet: 7.95 inches (202 mm).

Distance from base to rotating band: 3.11 inches.

Width of rotating band:

Forward: 1.14 inches.

Space: 0.26 inch.

Aft: 1.14 inches.

Radius of ogive: No data.

Filling:

Trinitroanisole (type 91 explosive): 17.38 pounds.

The charge consists of a preformed block of Type 91 explosive (trinitroanisole) with a well in the base to receive a gaine. The block is wrapped in waxed-paper, a $\frac{3}{16}$ -inch layer of fibrous cushioning material, and a cotton-flannel bag.

Fuzing: Type 13-year Mk 4 base fuze. Weapon in which used: Mk 2 20-cm/50 cal. dual-purpose gun.

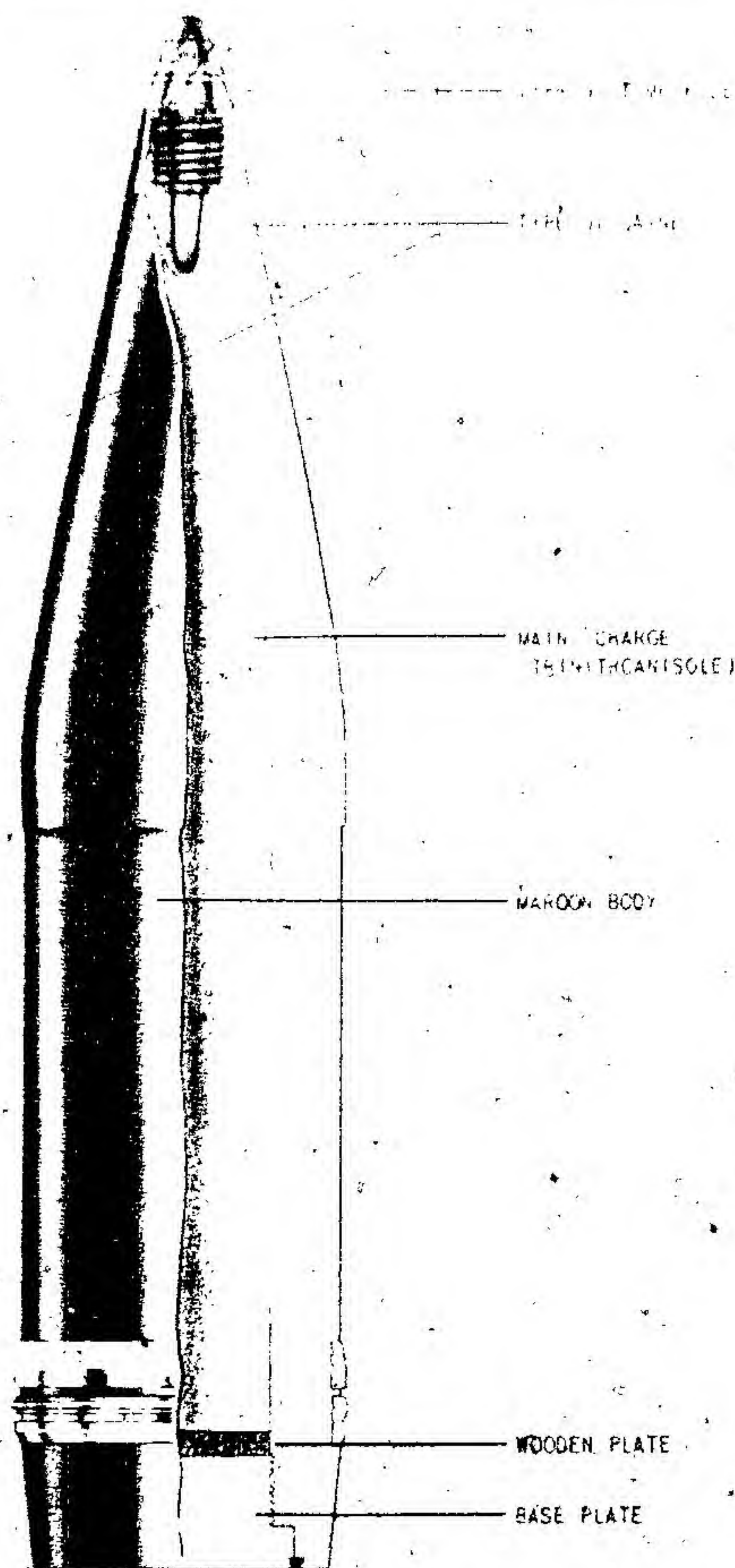


Figure 419—20-cm (Ordinary Type 0)
High-Explosive.

**(Ordinary Type 0) 20-cm (202-mm) (8-Inch)
High-Explosive**

Weight of filled projectile (without fuze): 383.14 pounds.

Weight of empty projectile: 261.8 pounds.

Weight stamped on rotating band (sample):
119.0 kg. (varies with individual projectiles).

Length of projectile (without fuze): 36.61 inches.

Diameter at bourrelet: 7.95 inches (202 mm).

Distance from base to rotating band: 3.11 inches.

Width of rotating band:

Forward: 1.14 inches.

Space: 0.26 inch.

Aft: 1.14 inches.

Radius of ogive: No data.

Filling:

Trinitroanisol (type 91 explosive): 21.34 pounds.

The charge consists of two preformed blocks of Type 91 explosive (trinitroanisol) enclosed in a cloth bag.

Fuzing:

• Type 91 mechanical time fuze.

Type 88 point detonating fuzes.

Weapon in which used: Mk 2 20-cm/50 cal. dual-purpose gun.

**20-cm (202-mm) (8-Inch) Cartridge Case
(Semifixed)**

Case:

Length: 15.25 inches.

Diameter of base: 9.58 inches.

Material: Brass.

Weight (empty): 18.6 pounds.

Propellant:

10 C3. (type 89 propellant): 4.4 pounds (2.0 kg.)

Unperforated cylindrical sticks approximately 1 mm. $\frac{1}{2}$ inch by $3\frac{1}{2}$ inches, 9 inches amber-colored double-base powder.

The propellant sticks are enclosed in two compartmented bags of heavy brownish silk. The inner bag contains 0.960 kg. (2.1 pounds) of propellant. The outer bag contains 1.040 kg. (2.3 pounds) of propellant.

Primer: Mk. 1 case percussion primer, Mod 4.

Weapon in which used: 20-cm. type 38 coast defense gun.

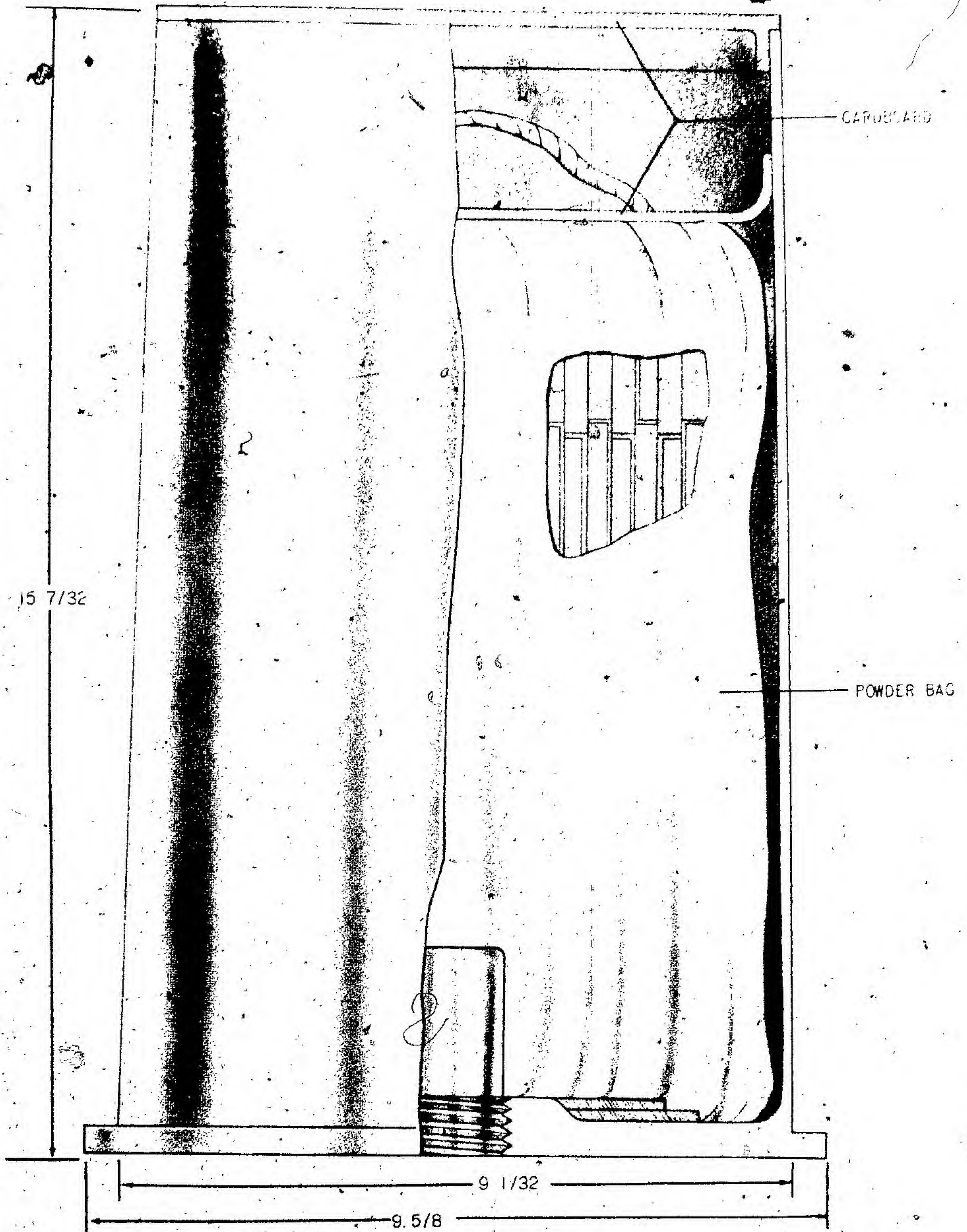


Figure 420—20-cm Cartridge Case (Semifixed).

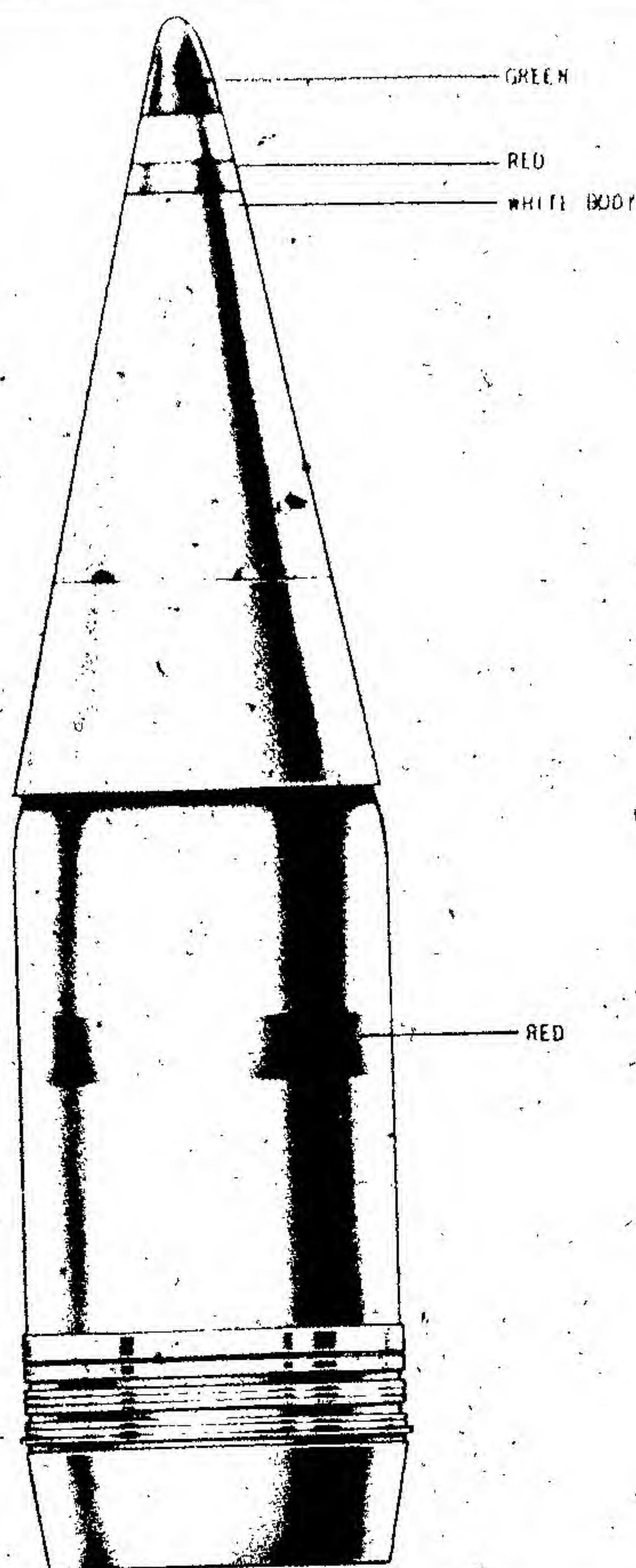


Figure 421—36-cm Armor Piercing.

36-cm (365-mm) (14-Inch) Armor-Piercing

Weight of filled projectile (without fuze): No data.
 Weight of empty projectile: No data.
 Weight stamped on rotating band (sample):
 656.00 kg. (varies with individual projectiles).
 Length of projectile (without fuze): 56.75 inches.
 Diameter at bourrelet: 14.00 inches.

Distance from base to rotating band: 5.75 inches.
 Width of rotating band:
 Forward: 2.00 inches.
 Aft: 1.56 inches.
 Filling: Probably trinitroanisolé (type 91 explosive).
 Fuzing: Type 13-year Mk 4 Mod 1 base fuze.
 Weapon in which used: 36-cm/45 gun (bag).

40-cm (406-mm) (16-Inch) Mk 5 Armor-Piercing

Weight of filled projectile (without fuze): No data.

Weight of empty projectile: No data.

Weight stamped on rotating band (sample): 975.00 kg. (varies with individual projectiles).

Length of projectile (without fuze): 56.50 inches.

Diameter at bourrelet: 16.00 inches.

Distance from base to rotating band: 1.97 inches.

Width of rotating band:

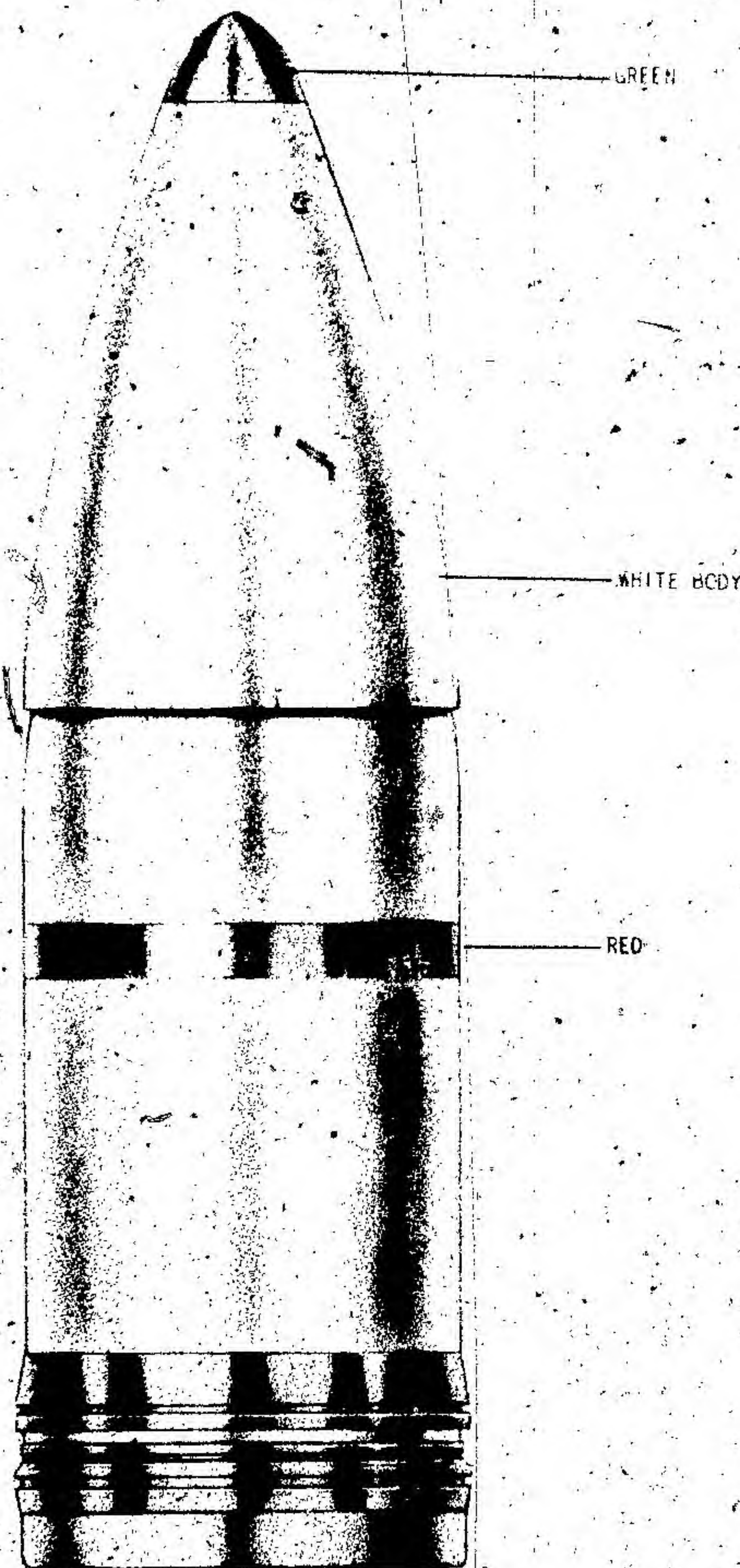
Forward: 2.65 inches.

Aft: 2.65 inches.

Filling: Probably trinitroanisole (type 91 explosive).

Fuze: Type 13-year Mk 3 base fuze.

Weapon in which used: 40-cm/45 gun (bag).

**Figure 422—40-cm Mk 5 Armor-Piercing.**

EXPERIMENTAL

Name	Purpose	Weight of charge (kg.)	Kind of charge	Weight total (kg.)	Diam. of motor (cm.)	Diam. of head (cm.)	Range (m.)	Lateral dispersion	Longitudinal dispersion
20-cm I. S. R.	Barrage and A. A.		Incendiary bomb, shrapnel	88.9	20	20	3700		
20-cm S. C. R.	Antitank		Type 98		20	20	1500		
18-cm S. C. R.	Antitank		Type 98		10	10	1000		
15-cm H. E. R.	Depth charge		Type 91		15	15	3000	About 10 per- cent of range.	About 10 per- cent of range.
12-cm H. E. R.	Barrage	1.53	Type 91		12	12	4800	About 10 per- cent of range.	About 10 per- cent of range.
10-cm H. E. R.	Barrage		Type 98	22.5	10	10	1200		
10-cm S. C. R.	Antitank	1.59	Type 94		10	10	1200		
8-cm H. E. R.	Barrage		Type 98	9.8	8	8	1200		
8-cm S. C. R.	Antitank	0.83	Type 94		8	8	1200		
2.5-cm H. E. R.	Barrage			5.56	2.5	2.5	1000		

H. E. R.—High-explosive rocket.
I. S. R.—Incendiary-shrapnel rocket.
S. C. R.—Shaped-charge rocket.

Chapter 5—Section 2

NAVY ROCKETS

Introduction

At the end of the war, the Japanese Navy had in production and use three rockets, a 12-cm incendiary-shrapnel, a 20-cm H. E., and a 45-cm

H. E. Drawings and data of these three rockets are given in this section.

There were several other rockets in the experimental stage, and a chart listing the salient features of these rockets is also given.

ROCKET DATA

Number of nozzles	Minimum nozzle diam. (mm.)	Igniter black powder (gm.)	Fuze	Launcher	Number of grains	Outer diam. of grain (mm.)	Inner diam. of grain (mm.)	Length of grain (mm.)	When developed	Remarks
6	16.5	50	Type 5 combination, Model 1.	Experimental	7	58	10		November 1944	
6		50	Type 5 percussion, Model 2.	Experimental					April 1945	Only experimental.
6			Type 5 percussion, Model 2.	Experimental					April 1945	Only experimental.
6			Antisubmarine fuze, Model 2.	Experimental					April 1945	Not used.
6	11.5	30	Type 5 percussion, Model 2.	Sextuple, mounted on 2 wheels.	7	35	5	360	January 1945	Used on the "Shinzo."
6	6.5	15	Type 5 percussion, Model 1.		7	30	5 and 10			Only experimental.
6	6.5	15	Type 5 percussion, Model 1.	Iron pipe	7	30	5 and 10		March 1945	Pierced armor 10-cm thick.
6	6.5	8	Type 5 percussion, Model 1.		7	16	9 and 5			Only experimental.
6	5.5	8	Type 5 percussion, Model 1.	Iron pipe	7	16	9 and 5		September 1944	Pierced armor 7-cm thick.
6			Percussion Model 4	Iron pipe					June 1944	Only experimental.

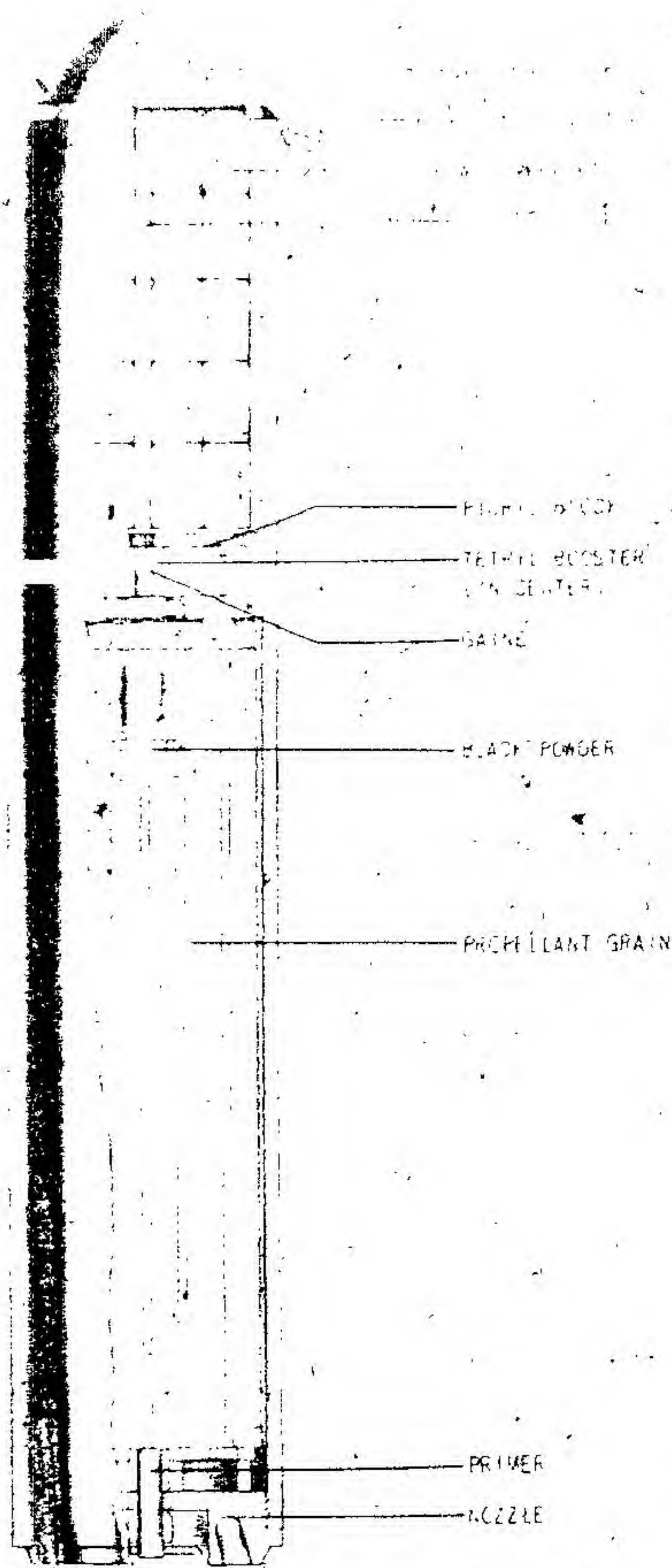


Figure 423—12-cm Incendiary Shrapnel Spin-Stabilized Rocket.

12-cm Incendiary-Shrapnel Spin-Stabilized Rocket

Assembled round:

Weight of complete round: 51 pounds (23.18 kg.).

Length of complete round: 28 $\frac{3}{8}$ inches.

Head:

Weight of filled head: 17 pounds 9 ounces.

Weight of filling: Picric burster charge, 4 $\frac{1}{2}$ ounces; incendiary cylinder filled, 10 pounds 11 $\frac{1}{4}$ ounces.

Length of head: 10 inches.

Length of incendiary cylinder: 7 $\frac{7}{8}$ inches.

Diameter of head: 4.7 inches (12 cm.).

Filling:

Picric acid burster charge: 4 $\frac{1}{2}$ ounces.

Incendiary cylinder (W. P. pellets): 10 pounds 11 $\frac{1}{4}$ ounces.

Fuzing: Simple powder delay fuze: Powder delay train type ignited by flash from primer in base of motor.

Motor:

Weight of filled motor: 13 pounds 11 ounces.

Weight of propellant: 7 pounds 5 ounces (3.3 kg.).

Length of motor: 17 $\frac{1}{8}$ inches.

Diameter: 4.7 inches (12 cm.).

Six nozzles are offset 21° to the longitudinal axis of the rocket.

Warhead—motor adapter:

Weight: 3 pounds 6 $\frac{1}{4}$ ounces.

Length: 2 $\frac{1}{8}$ inches.

Diameter: 4.7 inches (12 cm.).

Propellant:

6 long and 1 short grains of 150 special DT6 (60 percent nitrocellulose, 29.3 percent nitroglycerine, 2.85 percent ethyl centralite and 6.14 percent mononitronaphthalene).

Long grains are 14 inches by 1.345 inches (34 mm) single perforation $\frac{3}{8}$ inch in diameter. The short grain is identical to the long grains, but shorter (10 $\frac{1}{2}$ inches).

Ignition mechanism:

Igniter: Percussion primer.

Ignition charge: 1 ounce black powder in silk bag.

Color and markings:

Black over all. Three and one-half inches aft of nose piece is a $\frac{1}{2}$ inch yellow band. A second $\frac{1}{2}$ inch yellow band is located aft of the flange on the base plate. A label, carrying propellant data, is fixed in the motor.

Launcher:

The rocket is launched from a wooden trough mounted one on each side of the cockpit of the Jap suicide boat.

Remarks: The powder delay train type fuze used in the 12-cm. rocket allows the rocket to travel about 2,000 to 3,000 yards before the main charge is detonated.

20-cm (8-inch) High-Explosive Spin-Stabilized Rocket

Assembled round:

Weight of complete round (with fuze): 199.95 pounds (90.7 kg.).

Length of complete round (without fuze): 40.28 inches.

Head:

Weight of filled head (without fuze): 110.01 pounds (49.9 kg.).

Weight empty (body): 57.32 pounds.

Length of head (without fuze): 23.15 inches.

Diameter of head: 17.99 inches (203.0 mm).

Filling: Cast type 91 explosive (trinitroanisole): 38.58 pounds (17.5 kg.).

Fuzing: Type 4 rocket fuze: 1.76 pounds.

Motor:

Weight of filled motor: 88.18 pounds (40.0 kg.).

Weight empty (body): 43.21 pounds.

Length of motor: 17.21 inches.

Diameter at bearing surfaces: 7.99 inches (203.0 mm).

Six nozzles are offset at 25° from the longitudinal axis of the motor.

Propellant:

7 grains (11.42- by 2.28- by 0.43-inches perforation) of double-base smokeless powder, weighing a total of 18.30 pounds (8.3 kg.); code designation, 240 Special DT2. Documents state that 240 DT6 may also be used.

Ignition mechanism:

Igniter: Percussion primer.

Ignition charge (black powder in silk pad): 50.6 grams.

Color and markings:

Maroon over all, with the nose tipped with a 2.13-inch green band. A 0.35-inch yellow band appears at the junction of the motor and projectile. Labels are located on the body (date unknown), in the nose fuze pocket (bearing explosive data), and on the forward end of the motor base plate (bearing propellant data). A serial number is stamped on the motor base.

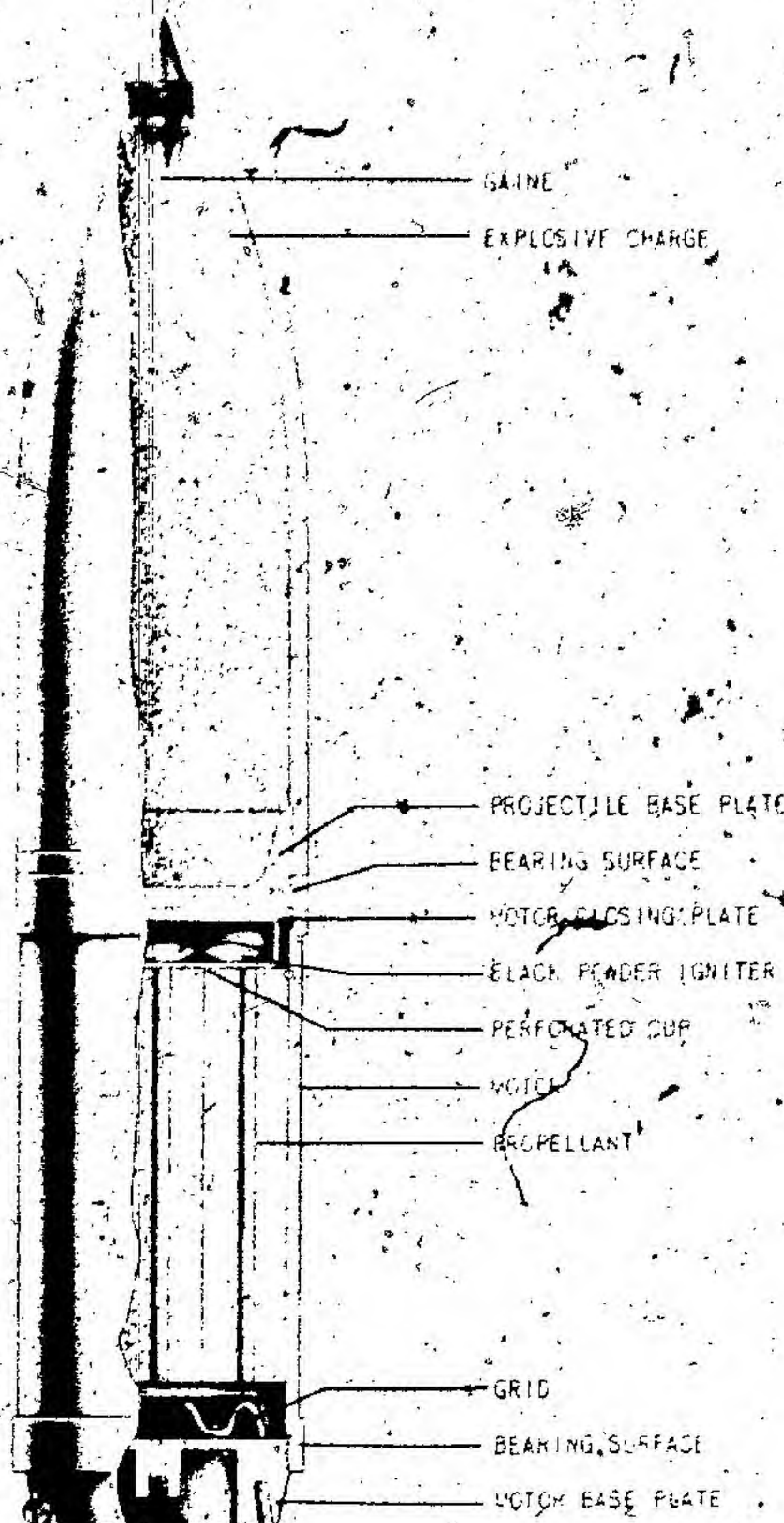


Figure 424—20-cm High-Explosive Spin-Stabilized Rocket.

Launcher:

Three signal-round launchers have been designed for this round. Two of these are trough-type, while the third is a barrel-type launcher. In addition a triple-mount trough-type launcher has been recovered.

Remarks: The head of this rocket consists of a slightly modified 20-cm projectile.

The rotating band is removed, and the round may be found with or without the rotating band groove, depending on the method of conversion.

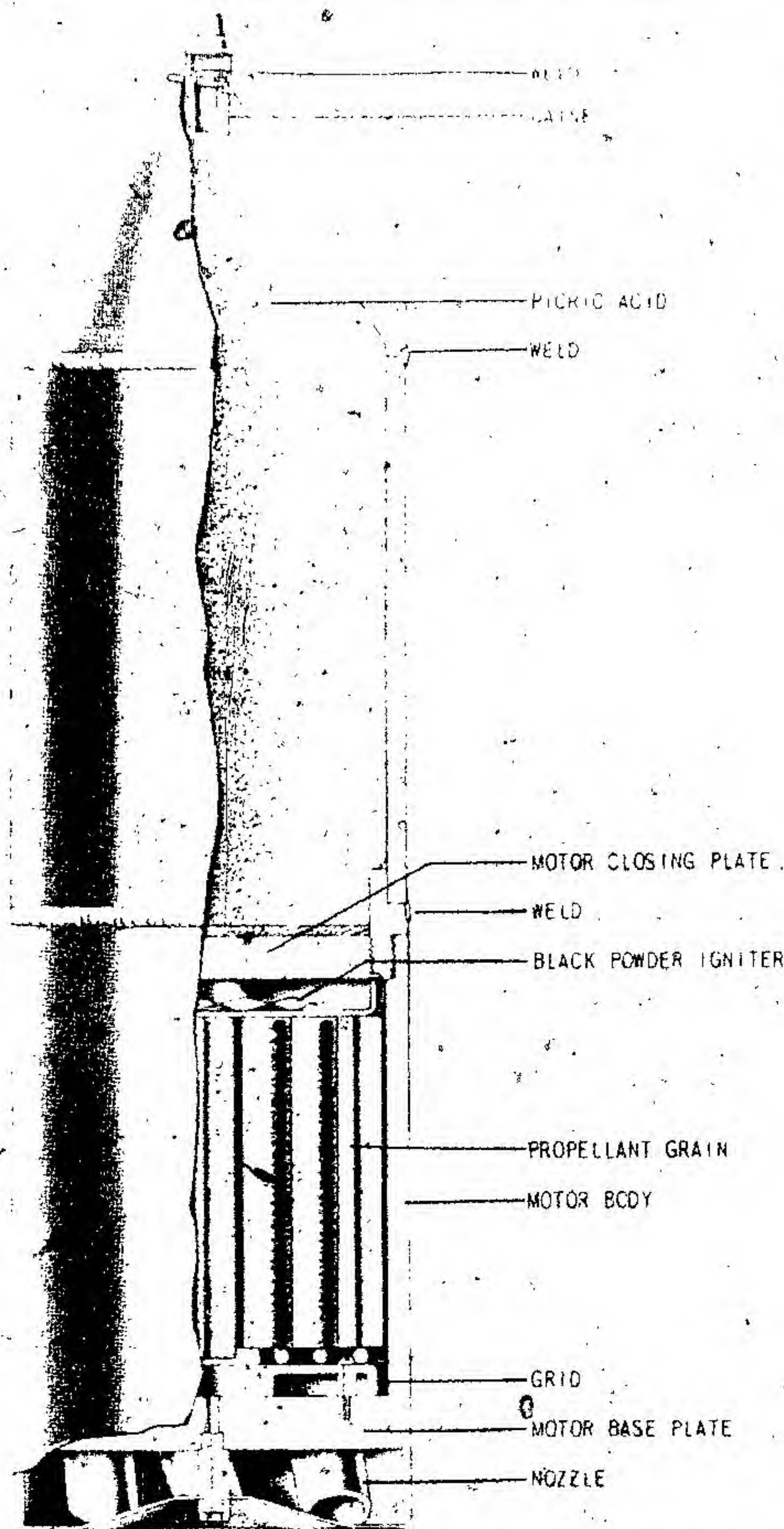


Figure 425—45-cm High-Explosive Spin-Stabilized Rocket

45-cm (17.75-inch) High-Explosive Spin-Stabilized Rocket

Assembled round:

- Weight of complete round (without fuze): 1,514 pounds (686.7 kg).
- Length of complete round (without fuze): 67.5 inches.

Head:

- Weight of filled head (without fuze): 942.7 pounds (427.6 kg).

- Weight empty (with coupling): 443.5 pounds.
- Length of head (without fuze): 40.5 inches.
- Diameter of head: 17.75 inches (45 cm).

Filling:

- Type 98 explosive (picric acid): 401.0 pounds (181.9 kg).

Fuzing:

- Type 4 rocket fuze.
- Army type 100 selective instantaneous or delay mortar fuze, with special adapter.
- When the latter fuze is employed, the Navy gaine well in the charge is filled with a picric pellet, recessed for an Army gaine.

Motor:

- Weight of filled motor: 571.3 pounds.
- Weight empty: 269.0 pounds.
- Length of motor: 27.0 inches.
- Diameter at bearing surfaces: 17.75 inches (45 cm).
- Six tapered nozzles are offset 18.5° from the longitudinal axis of the motor.

Propellant:

- 39 grains (15.25- by 2.31- by 0.41-inch perforation) of a double-base smokeless powder, weighing a total of 131.5 pounds and code 240 Special DT6.

The grains are green and red in color.

Ignition mechanism:

- Igniter: Percussion primer.
- Ignition charge (black powder in silk pad): 83.0 grams.

Color and markings:

- Maroon over all, with a green nose.
- An Arabic numeral is stenciled in white on the nose. A label, carrying propellant data, is fixed to the base of the motor.

Launcher:

- A crudely manufactured, wooden, trough-type launcher has been recovered for use with this ammunition.

Remarks: A variation of this round, incorporating modified coupling and base plug, has been recovered. The nose of the modified round is threaded to receive the fuze directly, whereas the nose of the original model carried an adapter welded into place. Although the internal dimensions of the modified round are identical to the first recovered specimen, the former weighs only 1,466 pounds.

Chapter 5—Section 3
NAVY MORTARS

Type 3 81-mm High-Explosive Mortar

Weight complete round: 7.23 pounds.

Weight main charge: 1.1 pounds.

Explosive components: Main charge:

Picric 57 percent.

Alpha-nitronaphthalene 43 percent.

Over-all length (without fuze): 11.5 inches.

Length fin assembly: 3.25 inches.

Maximum diameter at bourrelet: 3.19 inches (81 mm).

Maximum diameter of tail fins: 3.18 inches.

Color and markings:

Unpainted black steel body with a green band followed by a maroon band below the fuze. This is a simulation of standard Navy marking of H. E. projectiles which typically are painted maroon over all and tipped with green.

Fuzing: Type 3 combination fuze.

Weapon in which used: Navy type 3 8-cm mortar.

Description: The body of this shell is one-piece cast-steel streamlined construction with a well machined bourrelet having five bearing surfaces. An adapter ring screws (R. H.) into the nose, but there is no booster cup as in Army types.

Screwed into the base of the shell body is the tail-fin assembly consisting of a steel tube to house the propellant cartridge and having eighteen flash ports in six rows to pass the flash from the primary cartridge to the main propelling charge. Welded around the base of the tube are a series of twelve stabilizing tail fins. The main propelling charge is contained in doughnut-shaped silk bags, which are split so that they can be slipped around the propellant tube above the tail fins and over the flash ports.

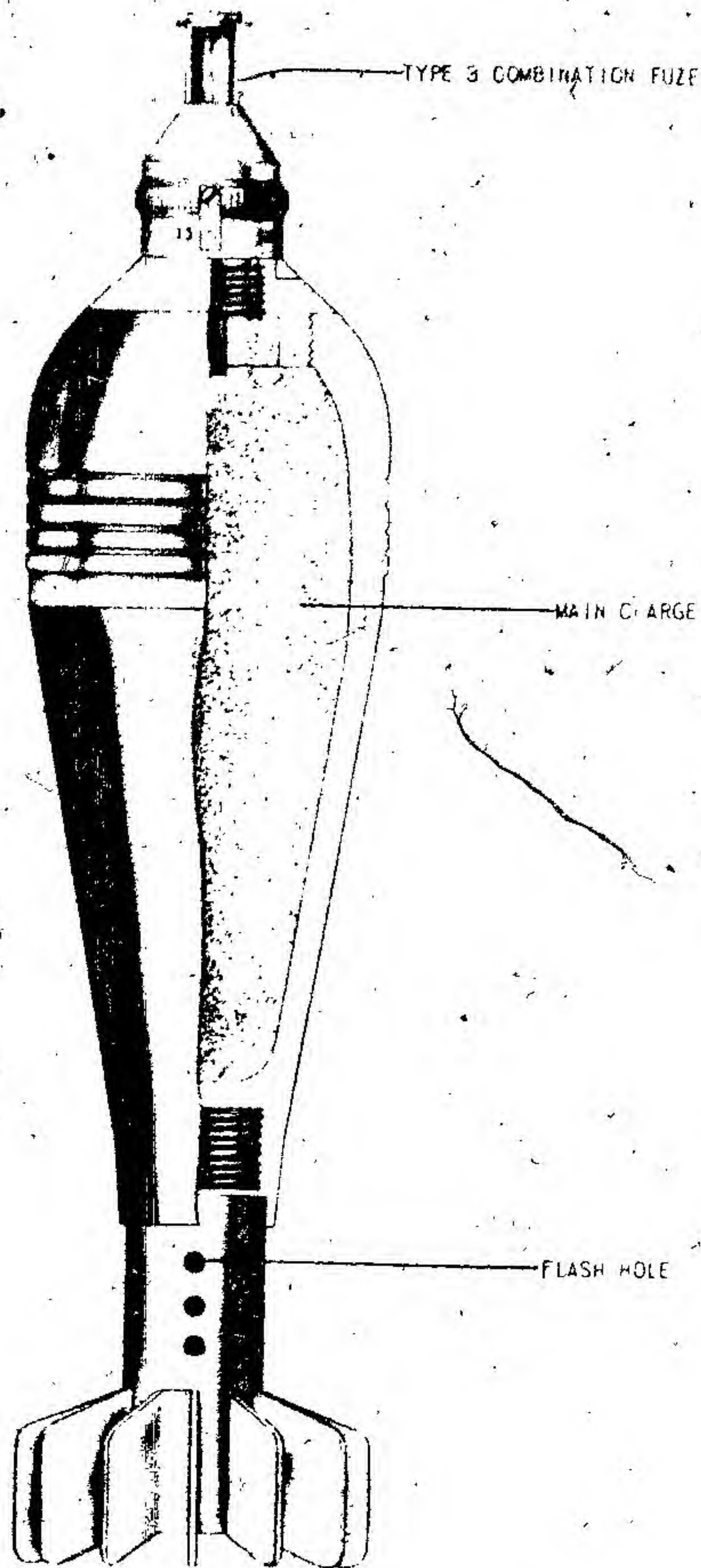


Figure 426—Type 3 81-mm High-Explosive Mortar.

Chapter 5—Section 4

NAVY PROJECTILE FUZES

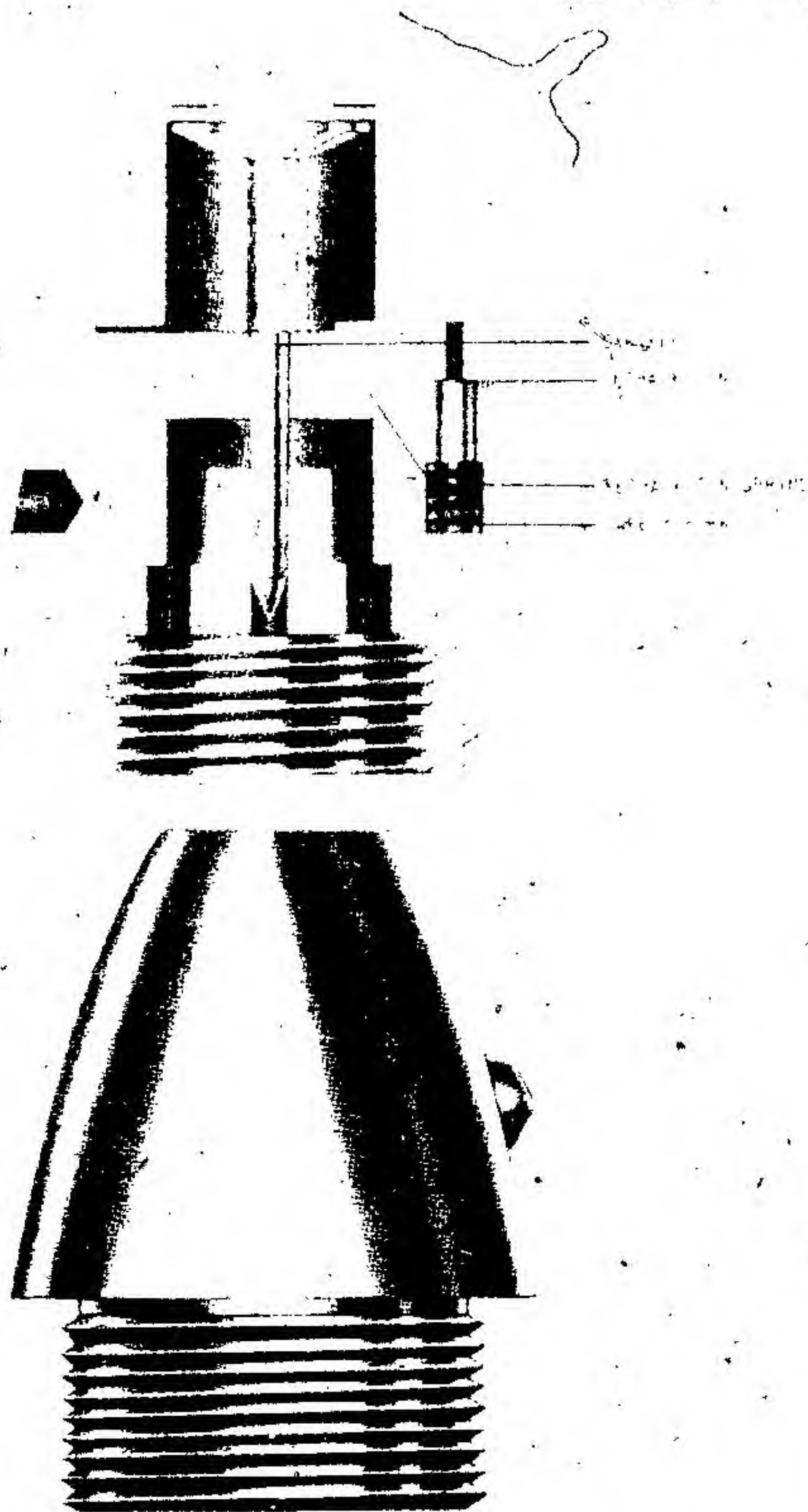


Figure 427—20-mm Model 1 Fuze.

20-mm Model 1 Fuze

Use: 20-mm projectiles.

Over-all length (with gaine): $1\frac{1}{2}$ inches.

Over-all length (without gaine): $\frac{3}{4}$ inch.

Maximum diameter: $2\frac{1}{2}$ inch.

Threaded length: $\frac{3}{8}$ inch.

Number of threads: 5.

Construction: The fuze is of one-piece construction. The striker extends from the nose of the

fuze into the lower fuze body and is supported by a safety fork which is held in place by a set-back pin. The gaine threads into the bottom of the fuze body.

Operation: On firing, the force of set-back causes the set-back pin to move down against its spring, thus releasing the safety fork. Centrifugal force causes the safety fork to move outward, and, when the projectile clears the bore of the gun, the safety fork is thrown clear of the projectile. This releases the striker which is driven down into the gaine on impact.

Remarks: There is a smaller version of this fuze that was originally used in the Swiss-made projectiles. It differs from the Model 1 fuze only in size.

20-mm Model 2 Impact Fuze

Use: 20-mm projectiles.

Over-all length (with gaine): $1\frac{1}{2}$ inches.

Over-all length (without gaine): $\frac{3}{4}$ inch.

Maximum diameter: $2\frac{1}{2}$ inches.

Threaded length: $\frac{3}{8}$ inch.

Number of threads: 5.

Construction: This is a rotor type fuze that is unique in that the firing pin instead of the detonator is housed in the rotor. The body is of two-piece construction. In the upper part of the body is a firing-pin extension. The rotor containing the firing pin is in the lower part of the body. The rotor is held in place by two centrifugal detents.

Operation: After firing, centrifugal force moves the detents out and turns the rotor until the firing pin is aligned with the firing-pin extension. The rotor is held in this position by centrifugal force, and on impact the firing-pin extension drives the firing pin into the gaine.

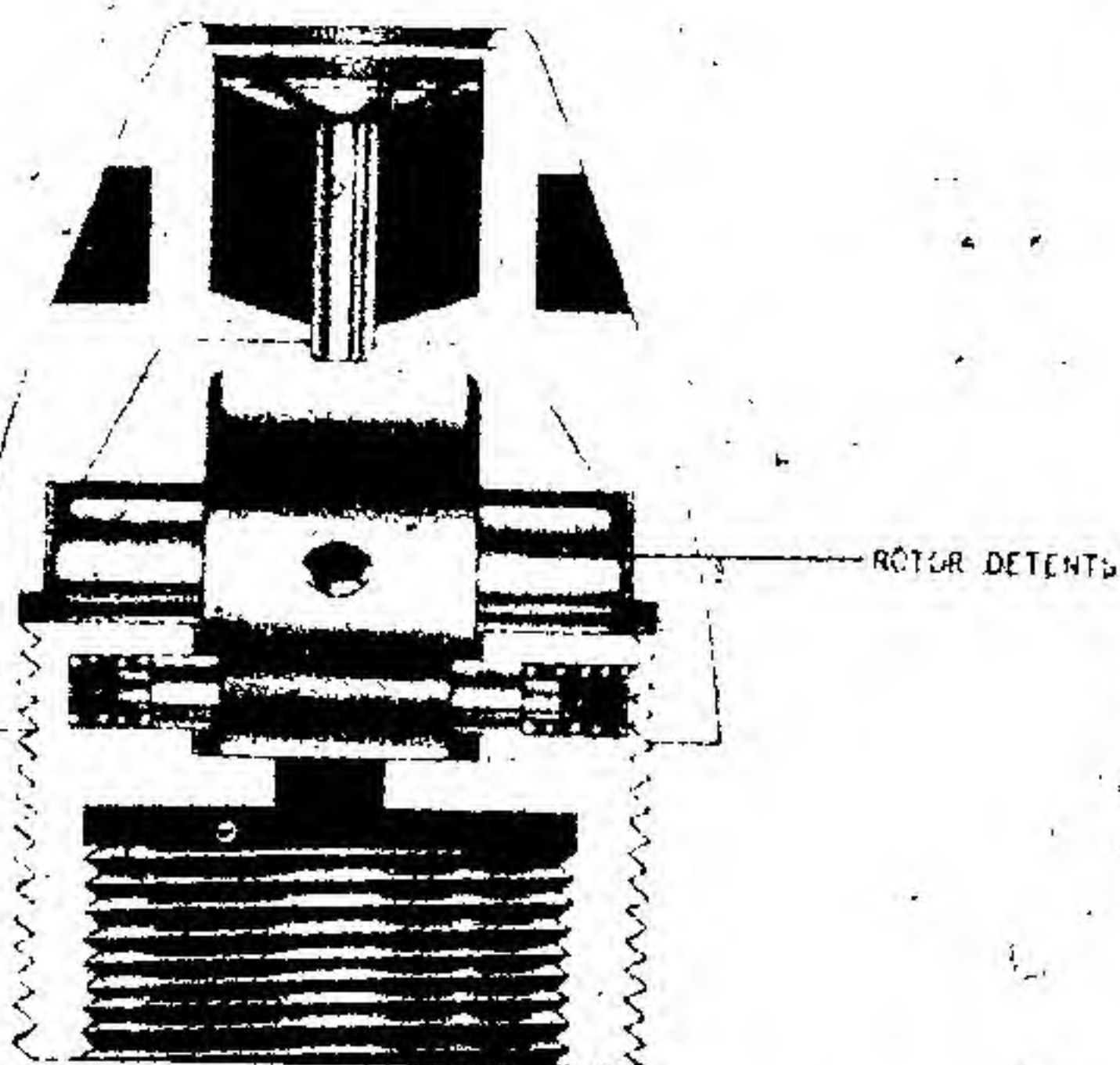
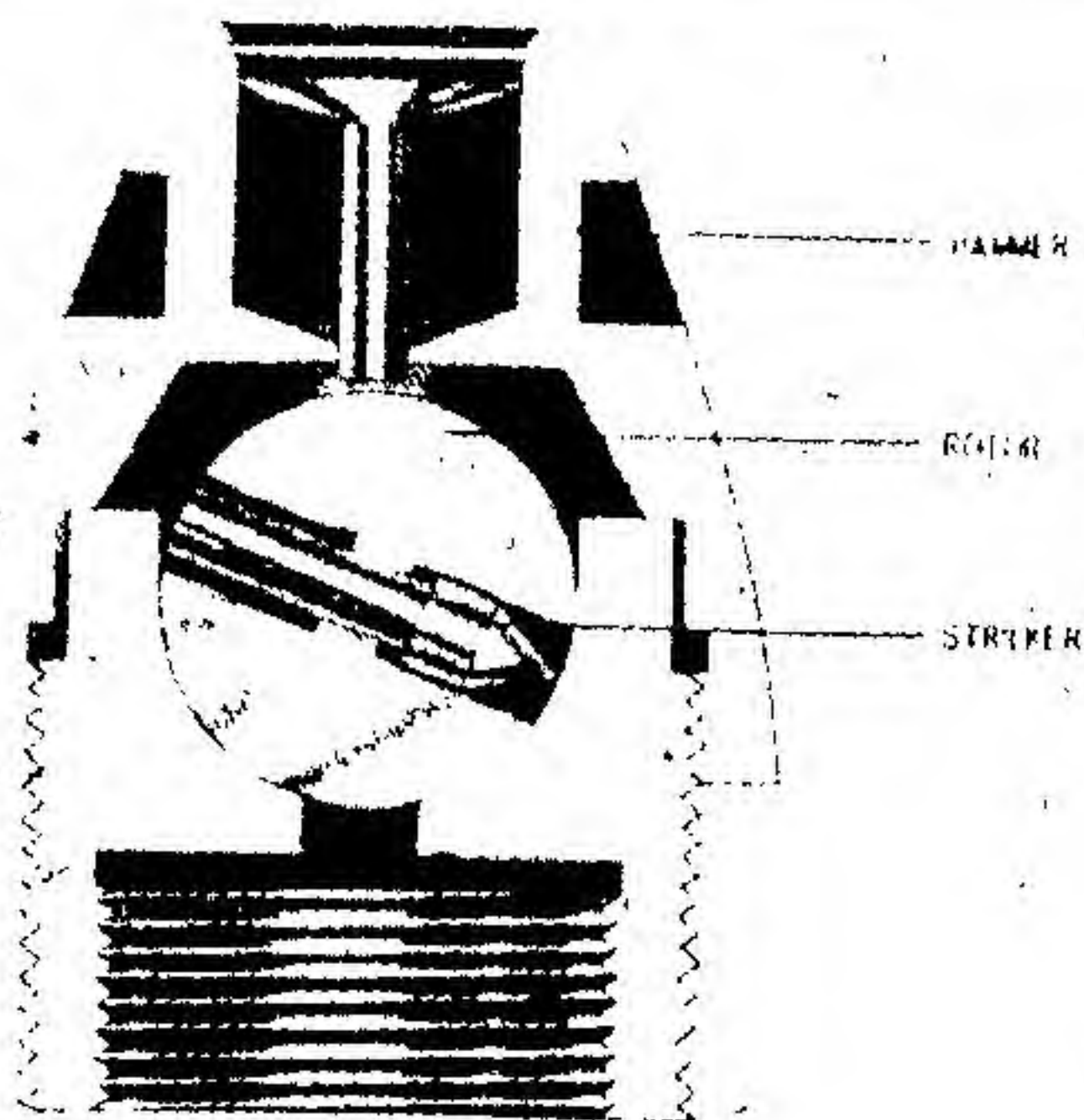


Figure 428—20-mm Model 2 Fuze.

20-mm Model 3 Impact Fuze

- Use: 20-mm projectiles.
- Over-all length (with gaine): $1\frac{1}{2}$ inches.
- Over-all length (without gaine): $\frac{3}{4}$ inch.
- Maximum diameter: $\frac{3}{8}$ inch.
- Threaded length: $\frac{1}{8}$ inch.
- Number of threads: 5.

Construction: There are two versions of this fuze, differing only in the fact that one is of one-piece construction and the other is of two-piece construction, having an inner metal collar threaded to the body. Threaded into the base of the fuze is a gaine, above which is an air column sealed at the top by a closing disc.

Operation: There are no arming features in this fuze. On impact, the closing disc is crushed inward, compressing the air in the column and firing the gaine.

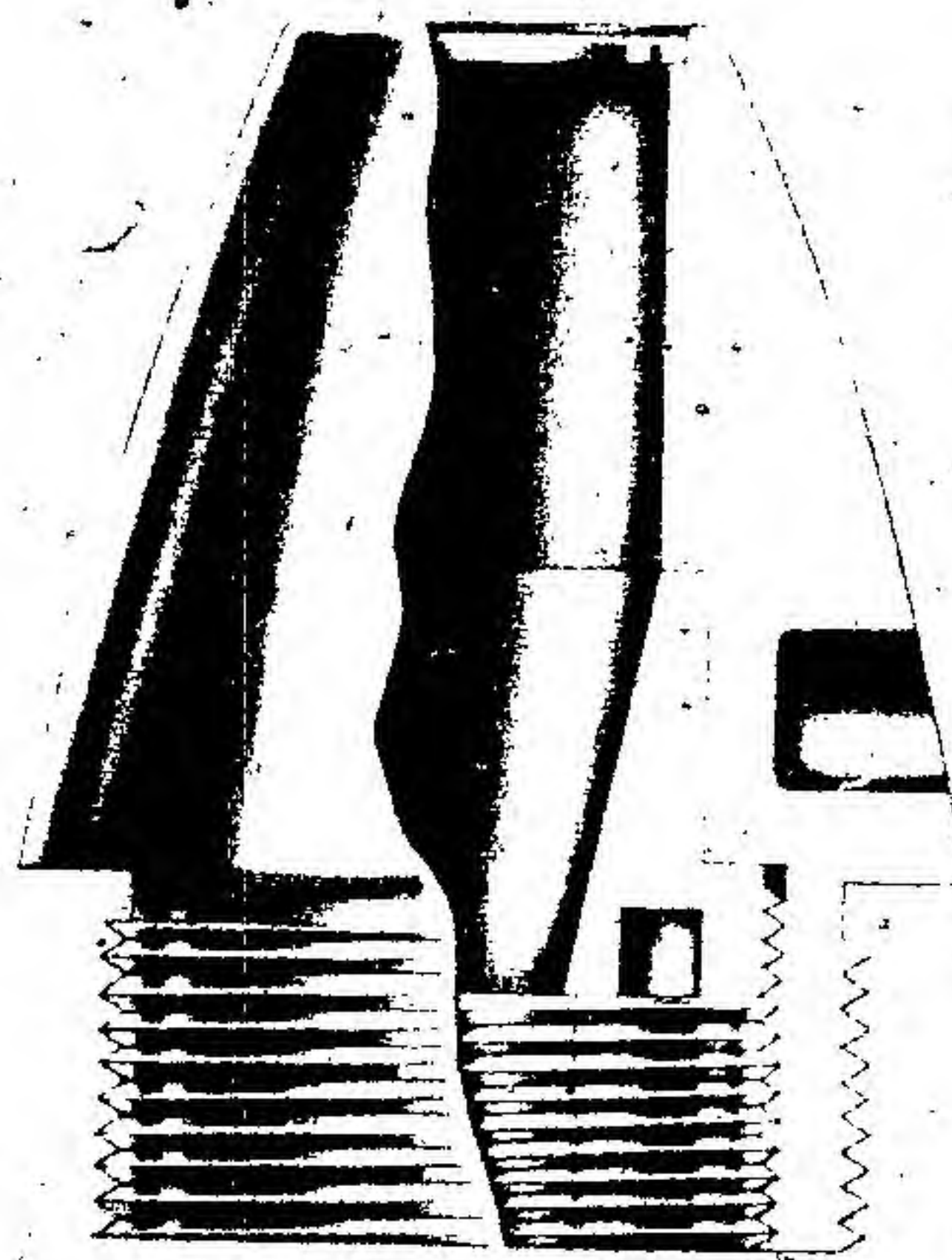
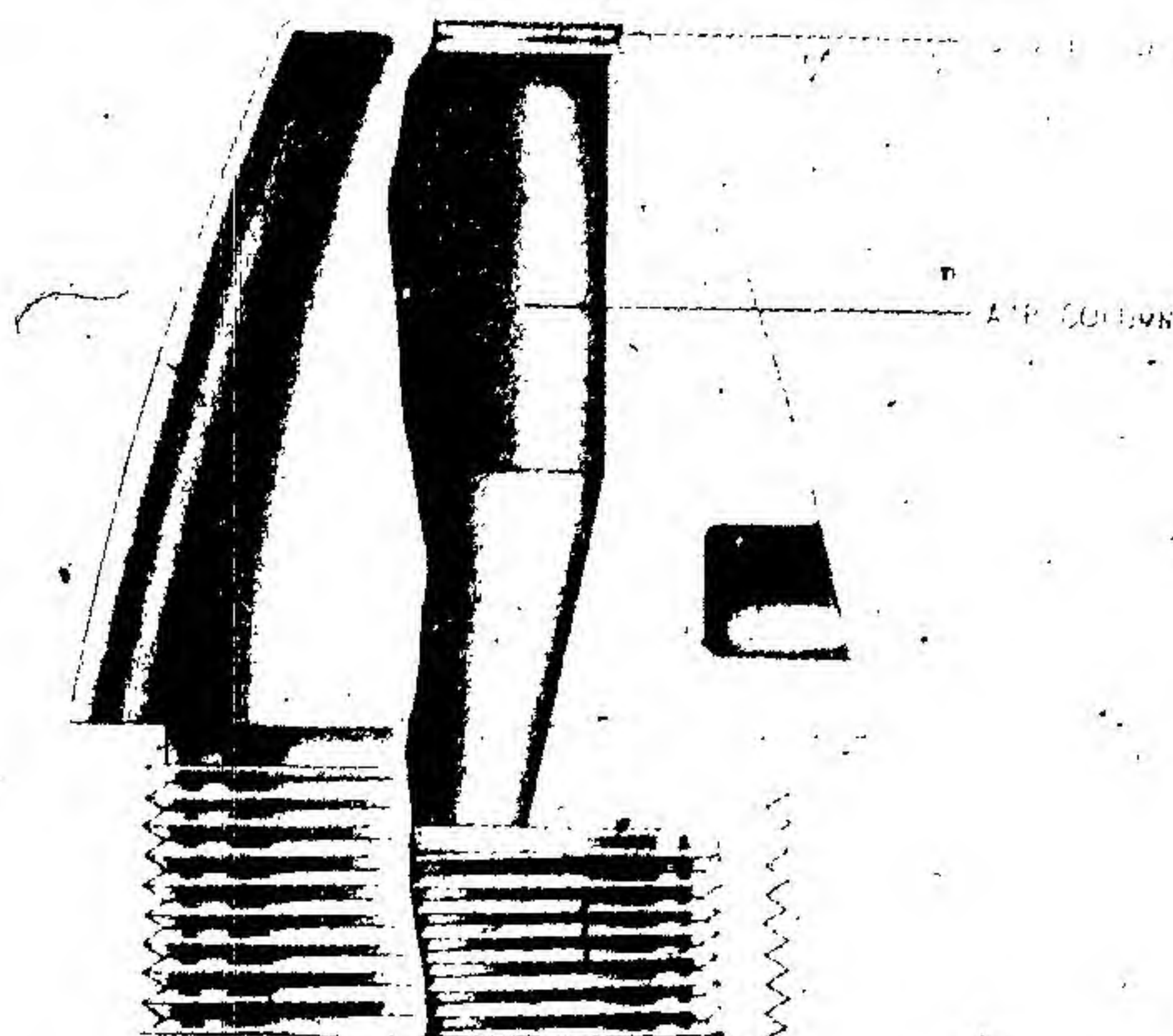


Figure 429—20-mm Model 3 Fuze.

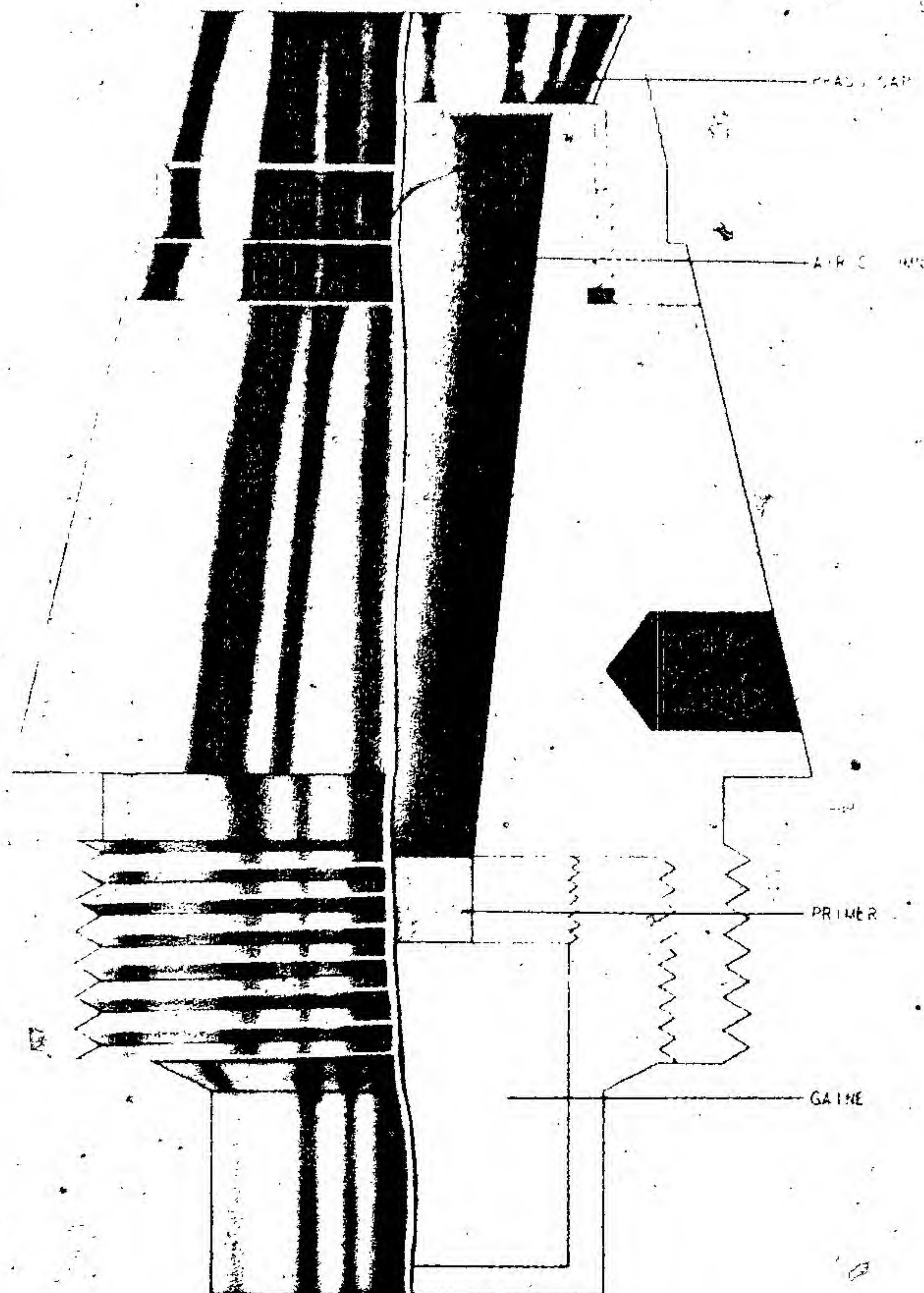


Figure 430—20-mm Two-Piece Fuze.

20-mm Two-Piece Fuze

Use: 20-mm projectiles.
 Over-all length (with gaine): $1\frac{1}{8}$ inches.
 Over-all length (without gaine): $1\frac{1}{16}$ inch.
 Maximum diameter: $2\frac{1}{2}$ inch.
 Threaded length: $\frac{3}{16}$ inch.
 Number of threads: 5.

Construction: A black steel nose section threads onto the brass body. The top of the air column is closed by a thin brass cap held between the nose section and the fuze body. Two spanner holes are present in the fuze body.

Operation: The fuze has no safety or arming features. On impact, the nose is crushed and the compression of the air in the air column detonates the gaine.

25-mm Model 1 Fuze

Use: 25-mm H. E. projectiles.

Over-all length (with gaine): $1\frac{15}{16}$ inches.

Over-all length (without gaine): $1\frac{1}{16}$ inches.

Maximum diameter: $\frac{3}{4}$ inch.

Threaded length: $\frac{3}{8}$ inch.

Number of threads: 6 R. H.

Construction: The fuze is constructed of brass in two pieces, the upper or nosepiece threading onto the main body. The striker extends from the nosepiece into the lower fuze body and is supported

by a centrifugal detent. A centrifugal flash hole shutter separates the primer from the gaine, and the shutter housing has a shoulder on which the primer cap rests. The gaine threads into the bottom of the fuze and holds the shutter housing in place.

Operation: After firing, centrifugal force moves the detent out and also causes the flash hole shutter to move, exposing the flash-hole. On impact, the striker is driven into the primer, which flashes into the gaine.

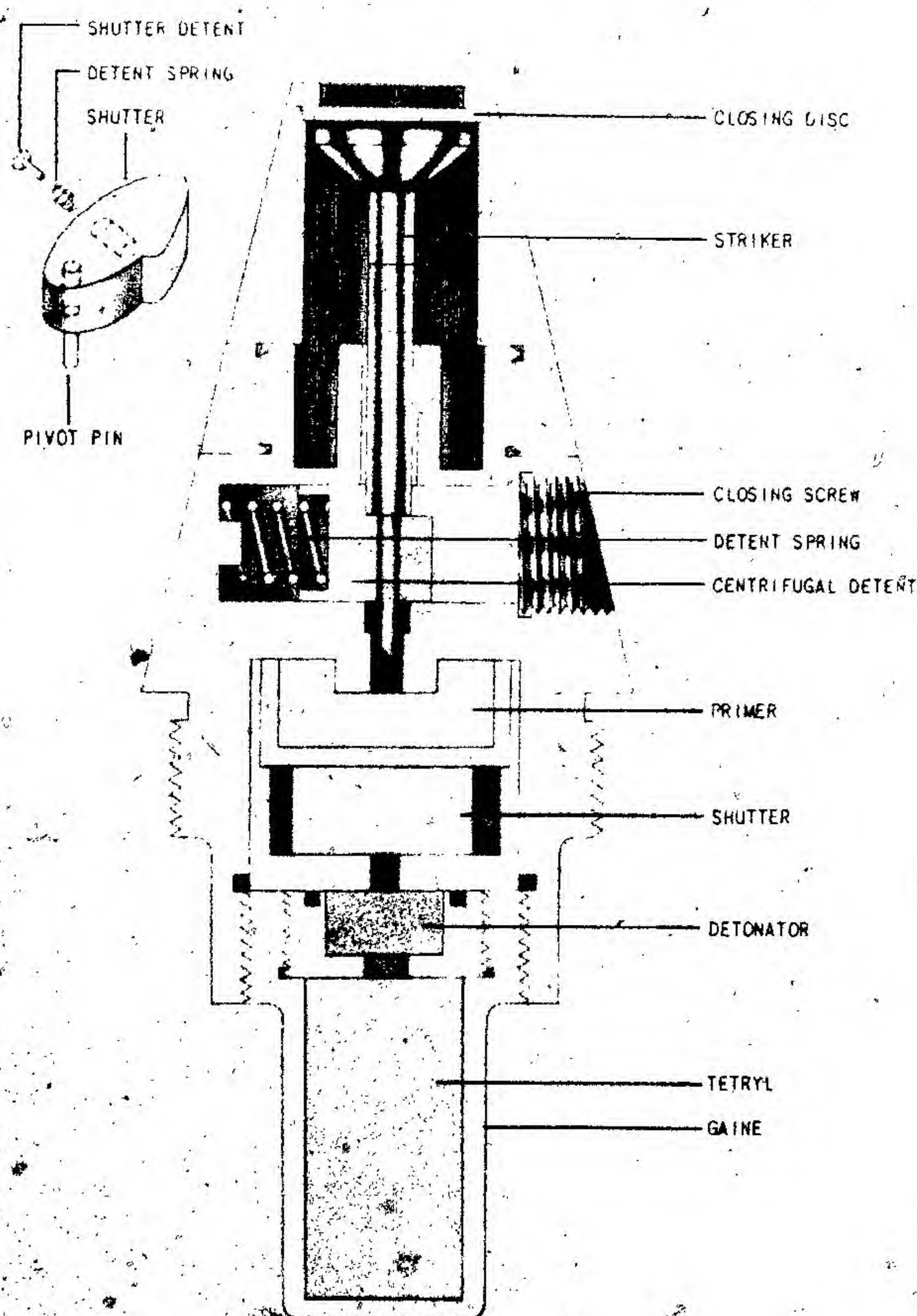


Figure 431—25-mm Model 1 Fuze.

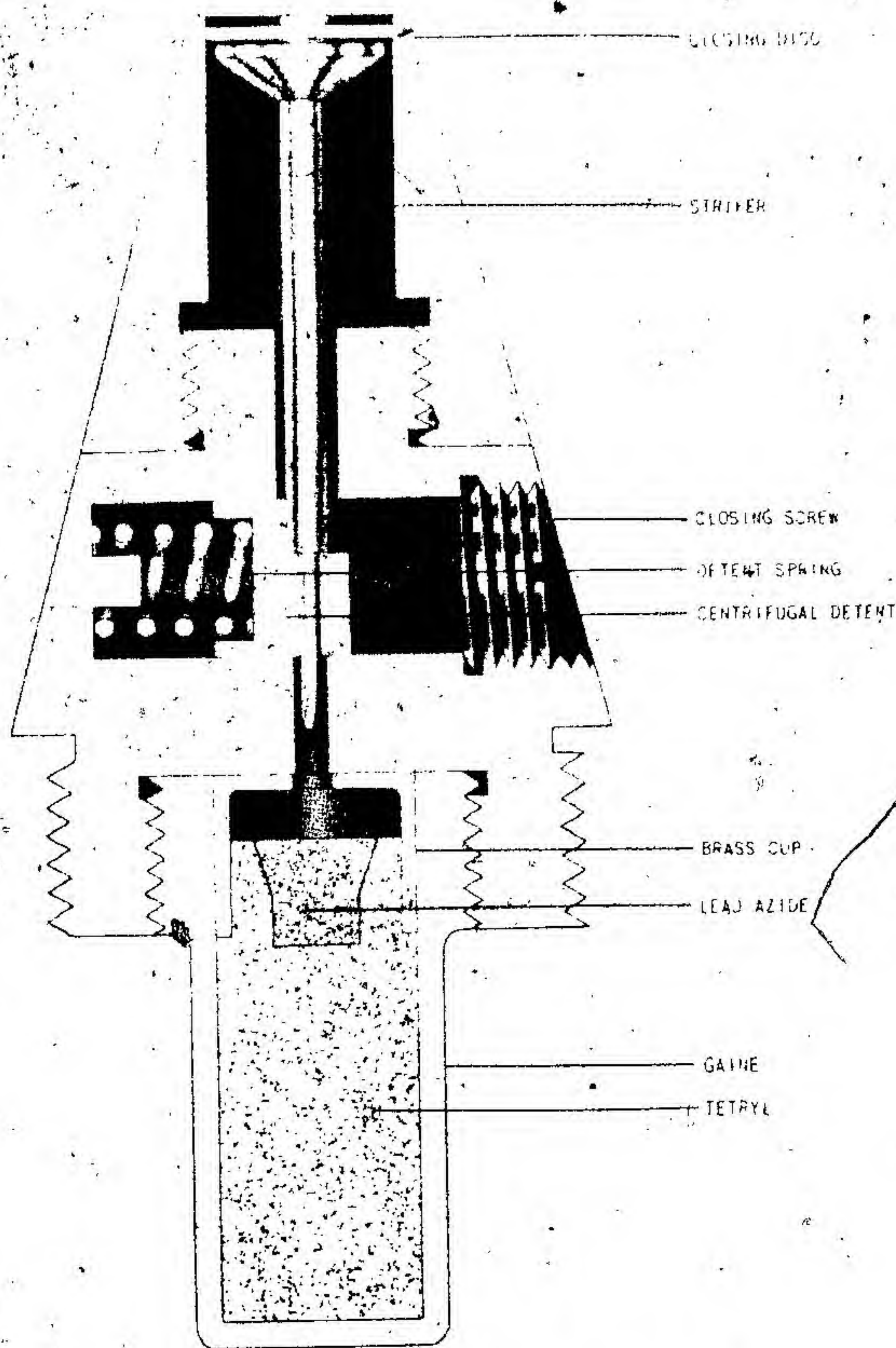


Figure 432—25-mm Model 4 Fuze.

25-mm Model 4 Fuze

Use: 25-mm H. E. projectiles.

Over-all length (with gaine): No data.

Over-all length (without gaine): $1\frac{3}{8}$ inches.

Maximum diameter: $\frac{3}{4}$ inch.

Threaded length: $\frac{3}{8}$ inch.

Number of threads: 6 R. H.

Construction: The fuze is constructed of brass in two pieces, with the upper or nosepiece threading onto the main body. In some cases the nosepiece has been found to be made of steel. The striker extends from the nosepiece into the lower fuze body and is supported by a centrifugal detent. The gaine is threaded into the lower fuze

body, with its uppermost part just below the striker point. A lead azide pellet is embedded directly below the primer in the gaine.

Operation: After firing, centrifugal force moves the detent out, arming the fuze. On impact, the striker is driven into the gaine, causing the fuze to function.

Remarks: This fuze differs from the type 1 in that its nose is more sharply pointed, the striker is longer, and the flash-hole shutter and housing are eliminated.

The type 4 fuze fits into a smaller cavity, and thus there is a larger amount of filling in the new projectiles.

30-mm Fuze

Use: 30-mm projectiles for aircraft cannon.

Over-all length (with gaine): $1\frac{1}{16}$ inches.

Over-all length (without gaine): 1 inch.

Maximum diameter: $1\frac{1}{2}$ inches.

Threaded length: $\frac{5}{16}$ inch R. H.

Number of threads: 4.

Construction: The fuze consists of the main body which houses the hammer, striker, rotor, and lower fuze body. The main body is made of aluminum, the lower fuze body and gaine of brass;

the remaining parts of aluminum-magnesium mixture. The striker is carried in a rotor, which is held in the unarmed position by two centrifugal detents. The lower fuze body threads (R. H.) in the main body and is threaded (R. H.) internally to take the gaine.

Operation: Centrifugal force causes the arming detents to move out, freeing the rotor, which then turns until the striker is in line with the hammer. On impact, the hammer drives the striker into the primer, which sets off the explosive train.

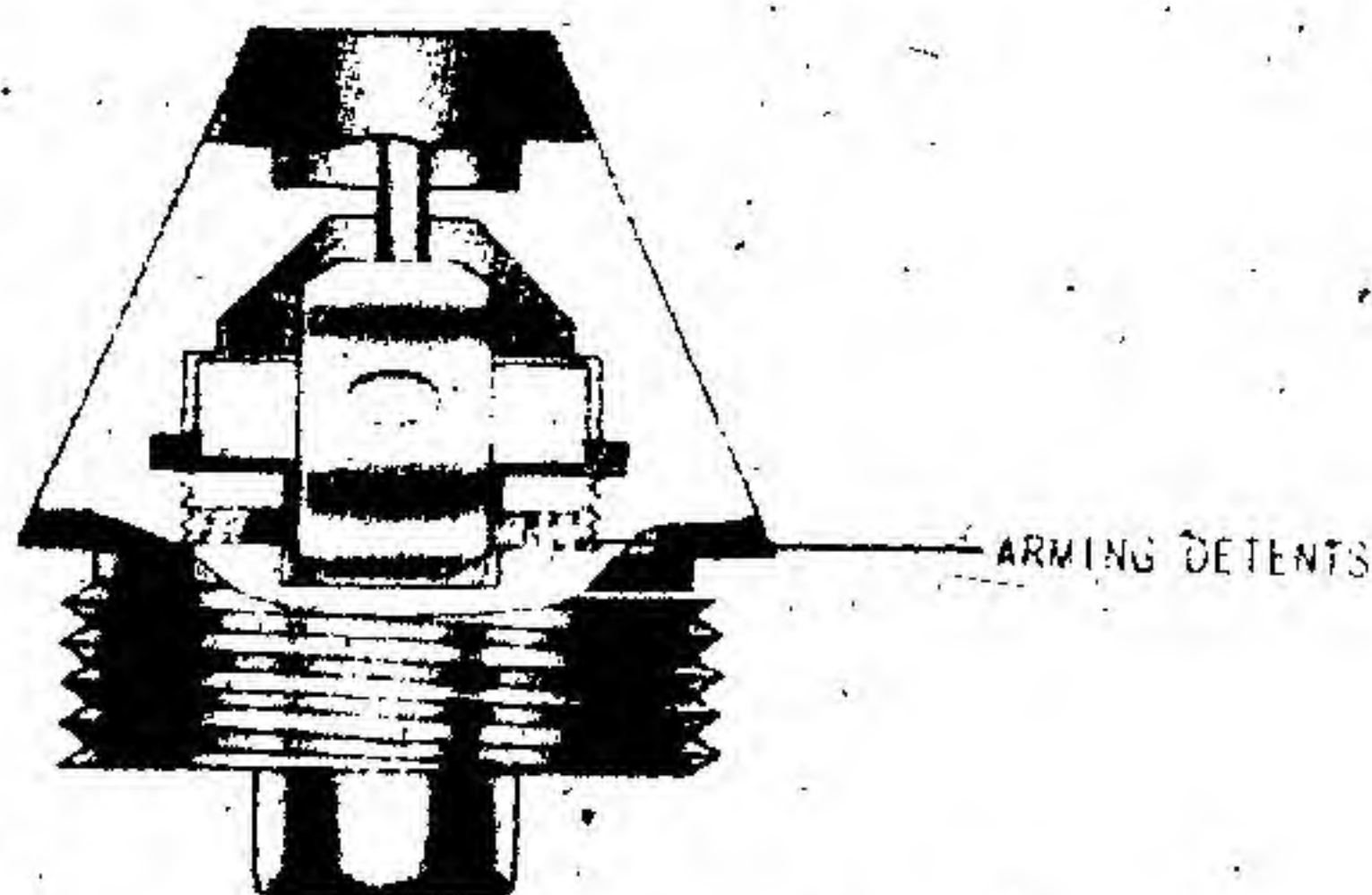
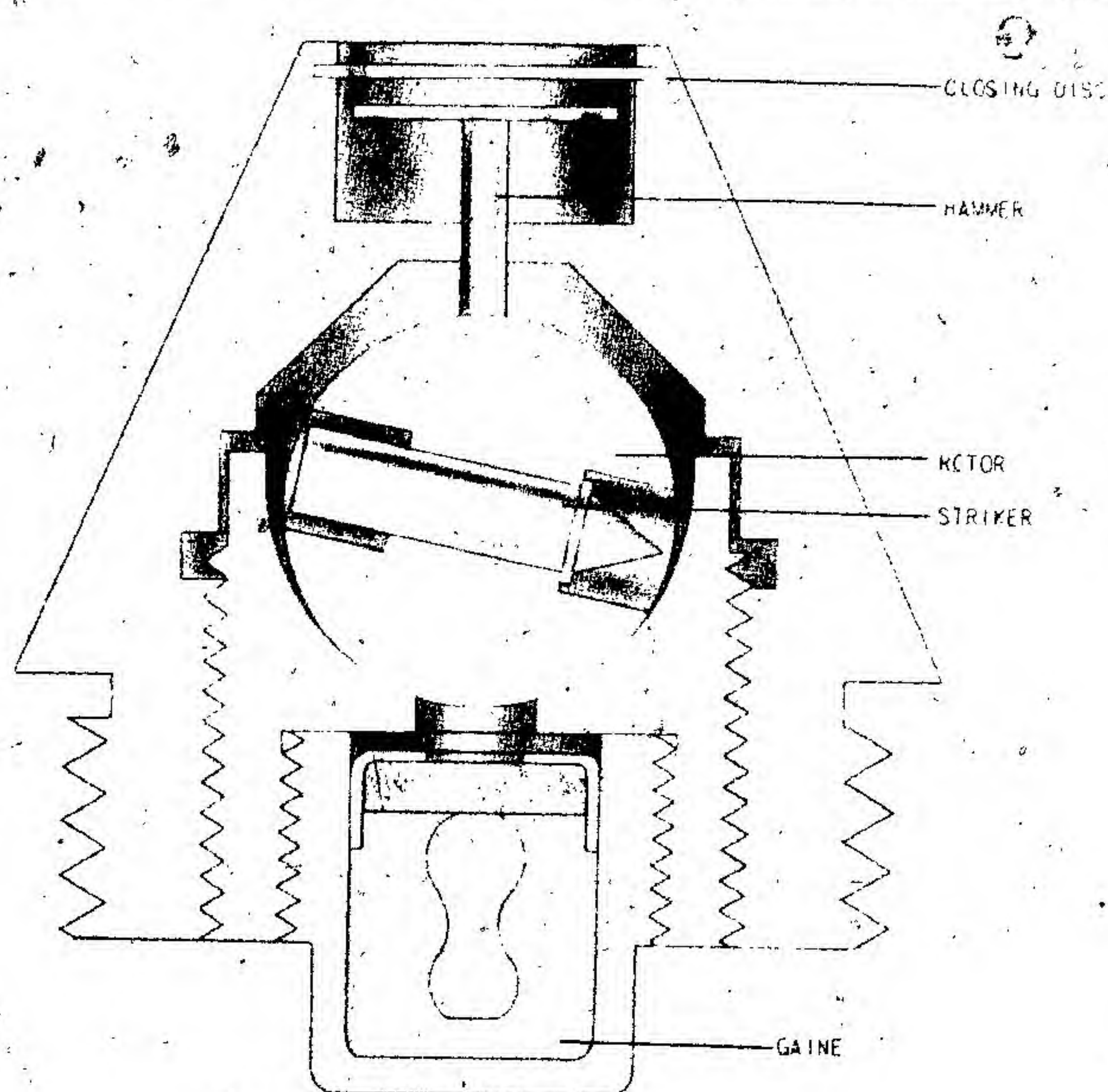


Figure 433—30-mm Fuze.

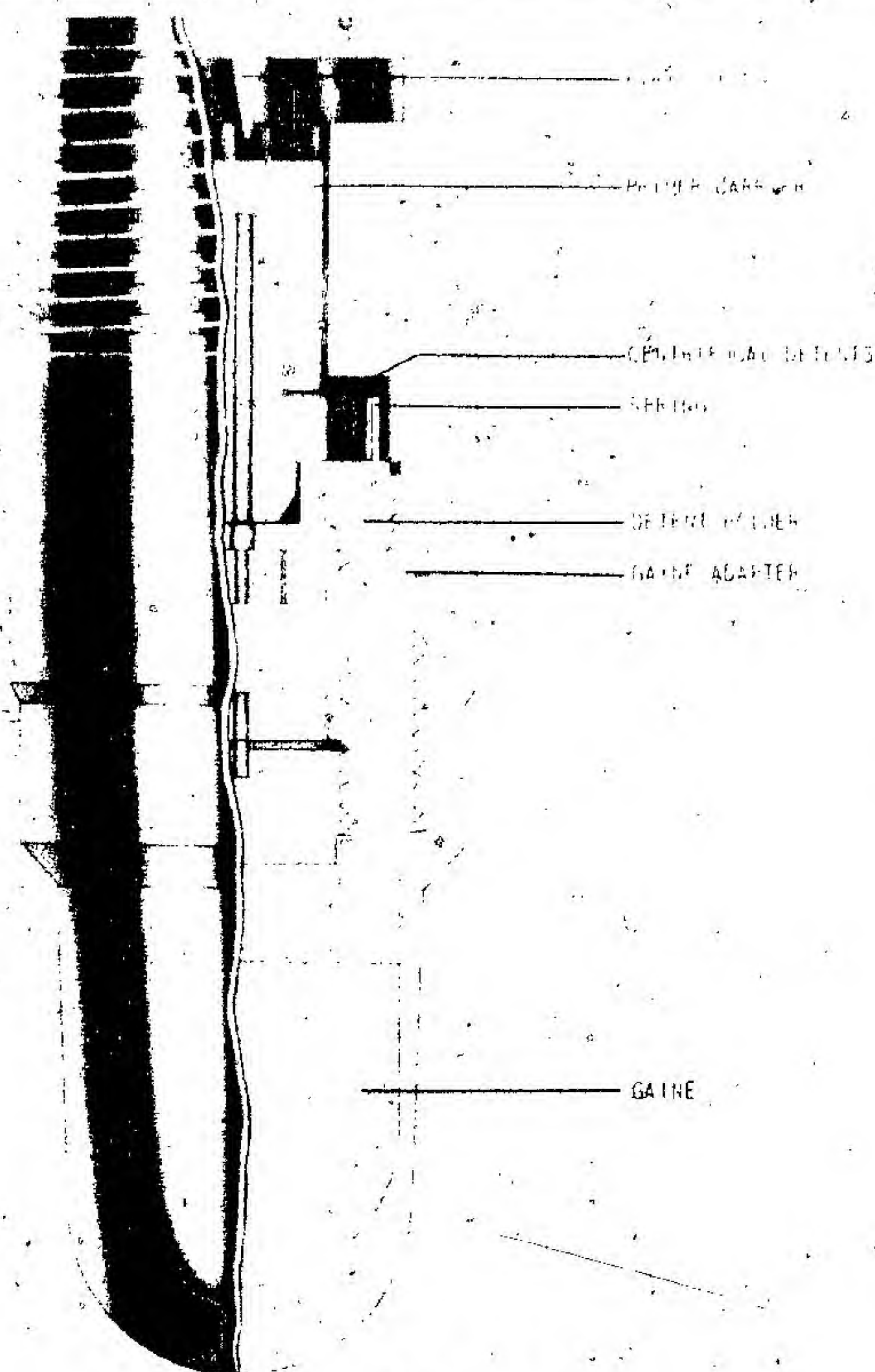


Figure 434—Type 1 Short-Delay Impact Fuze.

Type 1 Short-Delay Impact Fuze

Use: Type 1 A. P. projectiles for the 8-cm/40 Mk 2 gun

Over-all length: $3\frac{1}{4}$ inches.

Length (without gaine): $1\frac{1}{4}$ inches.

Threaded length: $\frac{1}{8}$ inch L. H.

Number of threads: 6.

Construction: The forward end of the fuze is externally threaded to fit into the base of the projectile nosepiece. The fixed firing pin threads into the firing pin holder, which threads into the forward end of the fuze body. The primer carrier, housed in the forward section of the fuze body, is held in the unarmed position by five detents which engage a shoulder on the primer carrier and are surrounded by a thin, flat spring. The detent holder threads into the fuze body from the after

end. A flash channel is cut, longitudinally, through the primer carrier and detent holder leading to the delay pellet and explosive train. A gaine adapter, threading into the base of the fuze body, contains the delay pellet, secondary primer, and sub-booster. The explosive gaine threads onto the gaine adapter.

Operation: Centrifugal force causes the five detents to open against their spring, much like a camera diaphragm, thus freeing the primer carrier to hit the fixed firing pin on impact. The flash from the primer passes through the channel in the primer carrier and detent holder to the delay pellet and explosive train.

Remarks: This fuze is installed in the forward end of the projectile at the junction of the nose piece and the projectile body, so that no part of the fuze is visible in the assembled projectile.

Type 88 Nose Fuze

Use:

- 12-cm ordinary projectiles (semifixed).
- 12-cm ordinary projectiles (fixed).
- 12-cm incendiary, shrapnel projectiles (fixed).
- 12.7-cm ordinary projectiles (fixed).
- 12.7-cm incendiary, shrapnel projectiles (semifixed).
- 14-cm ordinary projectiles (bag).
- 15-cm ordinary projectiles (bag).
- 15.5-cm ordinary projectiles (bag).
- 20-cm ordinary projectiles (semifixed).

Over-all length (with gaine): 3 1/4 inches.

Over-all length (without gaine): 5 1/2 inches.

Maximum diameter: 2 1/4 inches.

Threaded length: 7/8 inch.

Number of threads: 6.

Construction: This brass fuze consists of a nose cap, fuze body, and base plug. The base plug threads into the fuze body, forming a seat for the arming-cam carrier and housing the setback plunger. The arming-cam carrier supports five arming cams, which, in turn, rest under the shoulder and supports the striker. The setback

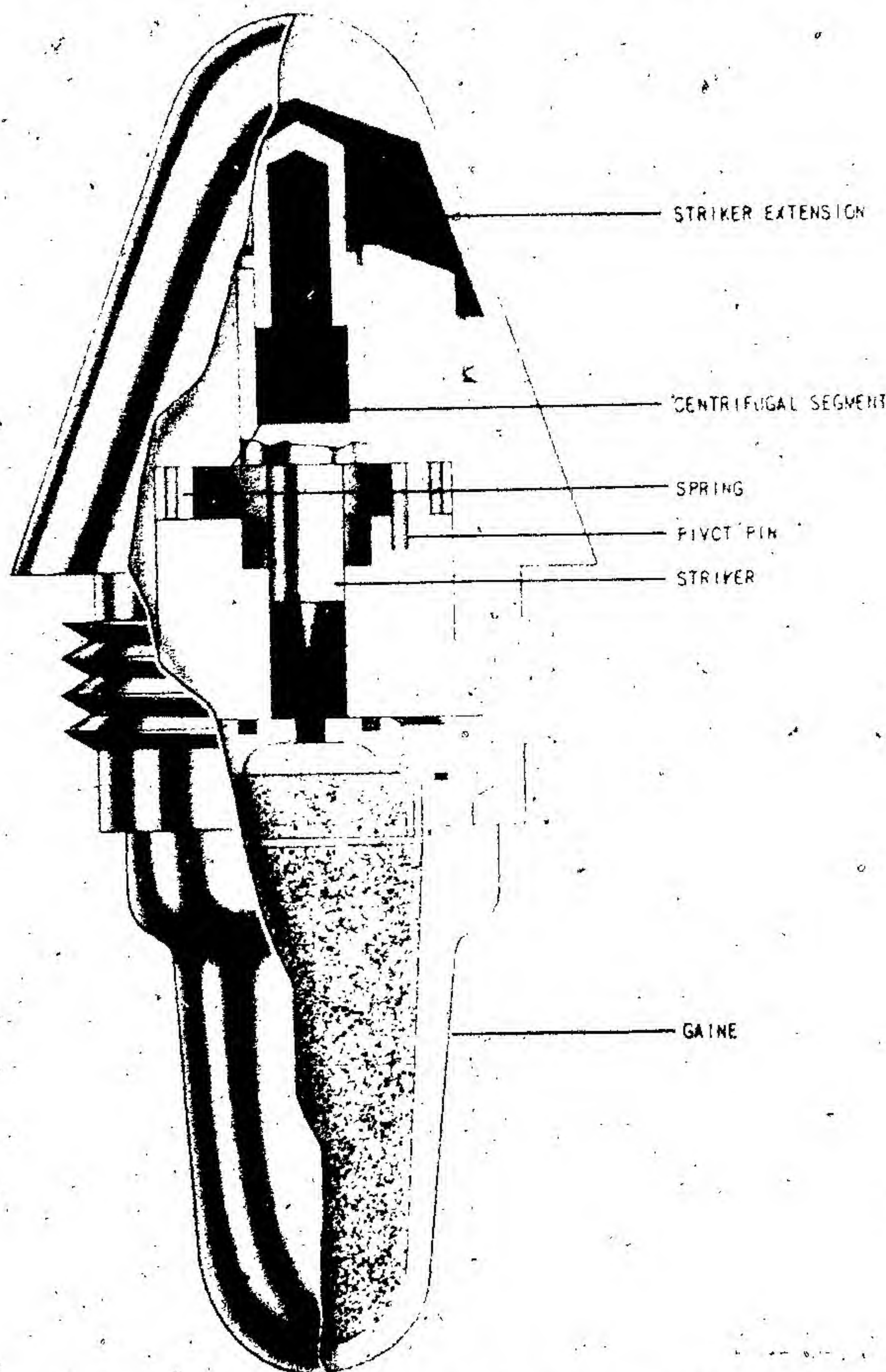


Figure 435—Type 88 and Type 88 Modification 1 Nose Fuze.

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plunger is held in the forward position by a steel sleeve crimped on the after end. The head of the plunger protrudes through and above the arming-cam carrier to prevent the moving out of a master detent which locks in position the remaining detents.

The striker is a machined piece fitting into a channel in the base plug, arming-cam carrier, and fuze body. The upper end of the striker has a shoulder which rests on the arming cams and is drilled longitudinally to receive the striker extension. The inner surface of the nose cap and the top of the striker extension are beveled so as to facilitate functioning on a low angle of impact.

There is a groove for a ball locking device located in the periphery of the threaded portion which threads into the projectile proper.

The gaine threads onto the after end of the base plug.

Operation: When the projectile is fired, the set-back plunger moves down into a recess in the base plug, thus freeing the arming cams, which move out from under the shoulders of the striker with centrifugal force. On impact, the nose cap is crushed, driving the striker onto the primer.

Remarks: In the type 88 Mod 1 fuze there is a safetypin which fits into a groove at the base of the set-back plunger, securing the plunger in the forward position.

Type 88 Model 2 Nose Fuze

Use:

- 12-cm ordinary projectiles (semifixed).
- 12-cm ordinary projectiles (fixed).
- 12-cm incendiary-shrapnel projectiles (fixed).
- 12.7-cm ordinary projectiles (fixed).
- 12.7-cm incendiary-shrapnel projectiles (semifixed).
- 14-cm ordinary projectiles (bag).
- 15-cm ordinary projectiles (bag).
- 15.5-cm ordinary projectiles (bag).
- 20-cm ordinary projectiles (semifixed).

Over-all length (with gaine): 3½ inches.

Over-all length (without gaine): 5½ inches.

Maximum diameter: 2¼ inches.

Threaded length: ¾ inch.

Number of threads: 6.

Construction: This fuze differs from the type 88 and the type 88 modification 1 in the following respects:

1. The gaine is threaded externally to fit into the base of the fuze body.
2. There is no set-back plunger or safetypin.
3. A flat spring surrounds and holds in position the arming cams.

Operation: Centrifugal force causes the arming cams to move out against the pressure of the flat spring from under the striker shoulder. The nose cap is crushed on impact, and the striker driven against the gaine.

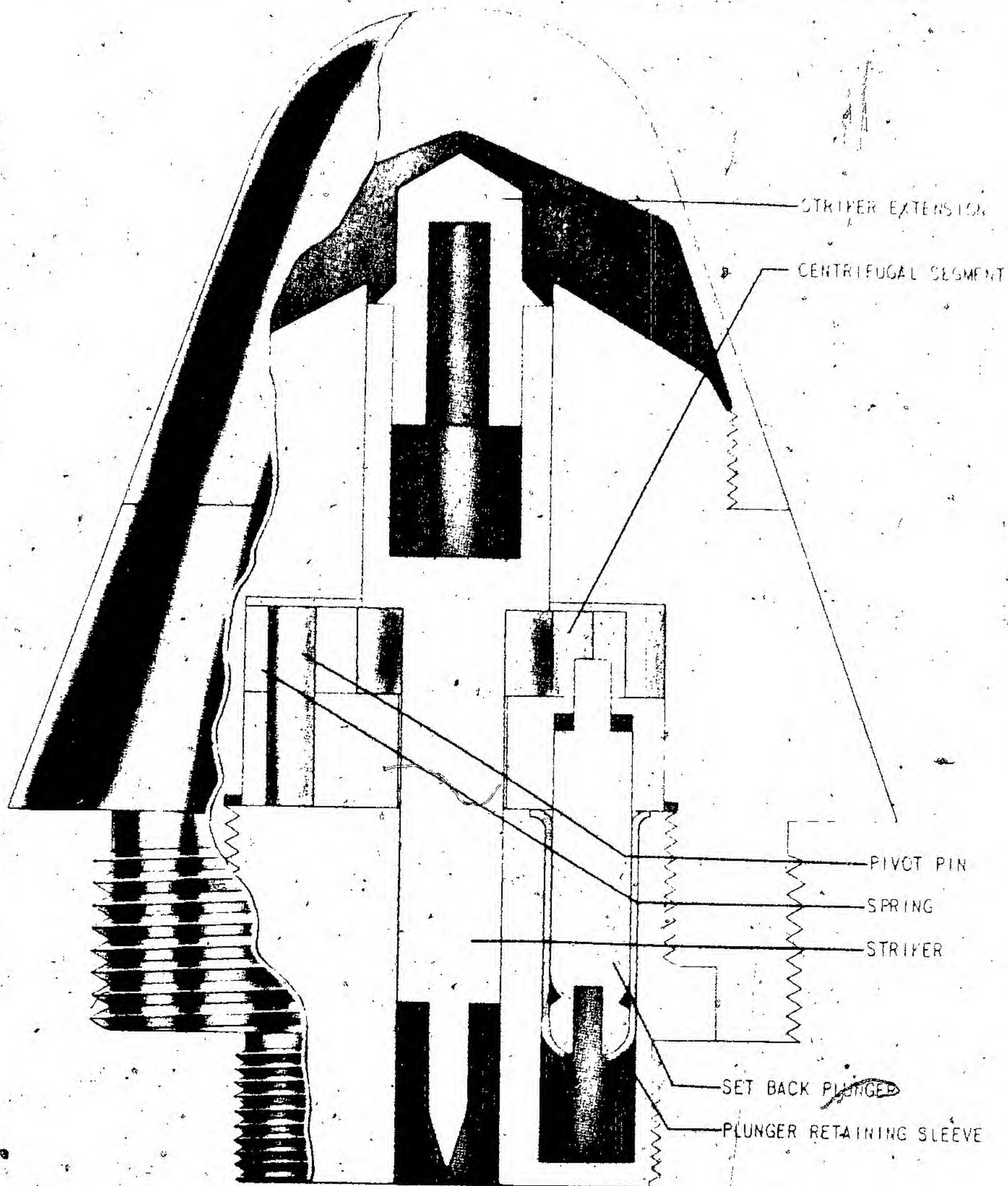


Figure 436—Type 88 Model 2 Nose Fuze.

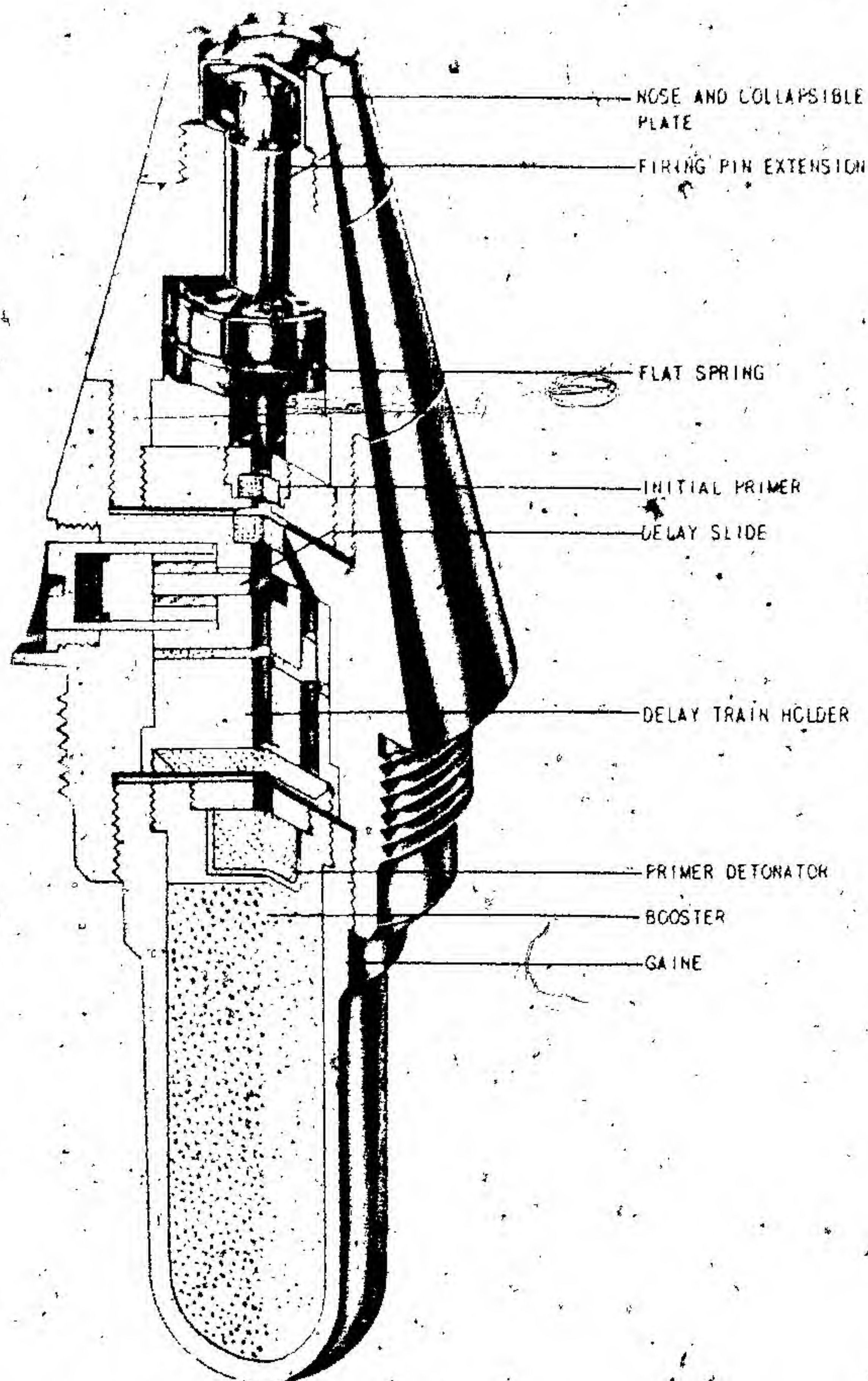


Figure 437—Type 88 Model 4 Instantaneous-Delay Fuze.

Type 88 Model 4 Instantaneous-Delay Fuze

Use: Ordinary projectiles for 12-cm and 20-cm short guns.

Over-all length (with gaine): 6½ inches.

Threaded length: ¾ inch.

Number of threads: 6.

Construction: The fuze body is made in three sections and is fitted together with threads. The upper section houses the head of the striker. The midsection houses the remainder of the

striker and the five centrifugal wedges, which rest under a shoulder of the striker and prevent contact with the primer in the unarmed position. These wedges are surrounded and held in position by a split steel band. The primer is also housed in the midsection. The lower section contains the delay element and the selector switch, which is externally controlled. The instantaneous flash channel, when the fuze is set for delay action, is closed by a small steel plate (delay slide). When set for instantaneous action, the selector switch

presents a recess allowing the delay slide, when centrifugal force sets in, to move out and free the instantaneous flash channel.

Operation: After the projectile is fired and begins to decelerate, the wedges are forced out by centrifugal force against a flat spring, thus freeing the striker. On impact, the striker is forced into the primer. The flash from the primer sets off

a delay powder train, which in turn initiates the gaine. If the fuze is set for instantaneous action, the delay slide moves out with centrifugal force, leaving a flash channel to the gaine, which is initiated directly.

Remarks: The setting of 0 to 5 seconds allows the projectile to sink approximately 25 meters before detonation.

Type 4 Nose Fuze

Use: 20 cm. rocket.

Over-all length (with gaine): $5\frac{1}{2}$ inches.

Over-all length (without gaine): $2\frac{1}{2}$ inches.

Maximum diameter: $2\frac{1}{4}$ inches.

Threaded length: $\frac{1}{8}$ inch.

Number of threads: 6.

Construction: The fuze is a centrifugally armed point detonating fuze constructed in two parts.

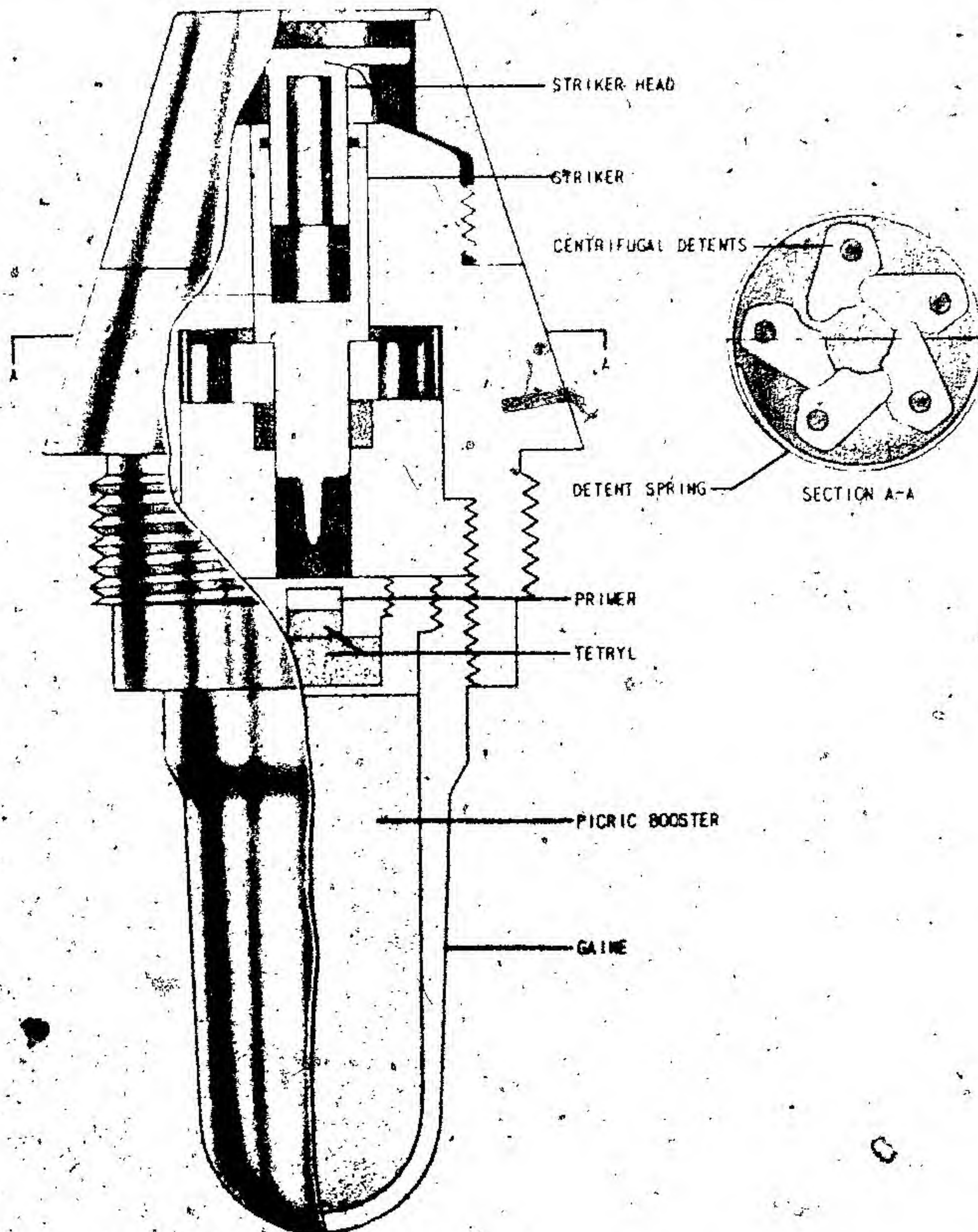


Figure 438—Type 4 Nose Fuze.

The upper body contains a copper closing disk and threads onto the lower body to form the head of the fuze. The lower body houses the striker and centrifugal detents, and is threaded to take the gaine. The lower portion of the striker has a smaller diameter forming a shoulder to bear against the detents. The upper end is hollowed to receive the striker head. The striker head has a disk on the upper end to form the striking head, and a flange to prevent its being seated too deeply in the hollowed end of the striker. The centrifugal detents are pivoted on a mounting which threads

into the base of the lower body above the gaine. A spring band holds them under the striker shoulder. The detents are so arranged that they can only move out in sequence to release the striker.

The gaine threads into the lower fuze body.

Operation: Rotation of the rocket in flight causes the centrifugal detent to move out against the detent spring so as to clear the shoulder of the striker. Impact crushes the fuze head and drives the striker down into the gaine.

Type 5th-Yr. Nose Fuze

Use:

8-cm ordinary projectiles (fixed and semi-fixed).

12-cm ordinary projectiles (semifixed).

14-cm ordinary projectiles (bag).

Over-all length (with gaine): 5½ inches.

Over-all length (without gaine): 1½ inches.

Maximum diameter: 1¾ inches.

Threaded length: ¾ inch.

Number of threads: 9 R. H.

Construction: The fuze body is of two-piece brass construction, with the upper part, or nose cap, threading (R. H.) onto the lower part. The lower portion is threaded (L. H.) internally to take the gaine. The gaine is made of light steel. A heavy striker fits against the interior top of the nosepiece, which is beveled to facilitate functioning with a low angle of impact. The lower fuze body contains a primary primer and a secondary striker.

Operation: On impact, the nose cap is sheared off or crushed, forcing the first striker into the first primer. This explosion forces the secondary striker down, shearing the shear pin and causing the gaine to function.

40-mm Powder Time Fuze

Use: 40-mm A. A. projectiles.

Over-all length (with gaine): 3½ inches.

Over-all length (without gaine): 2½ inches.

Maximum diameter: 1½ inches.

Threaded length: ¾ inches.

Number of threads: 6 R. H.

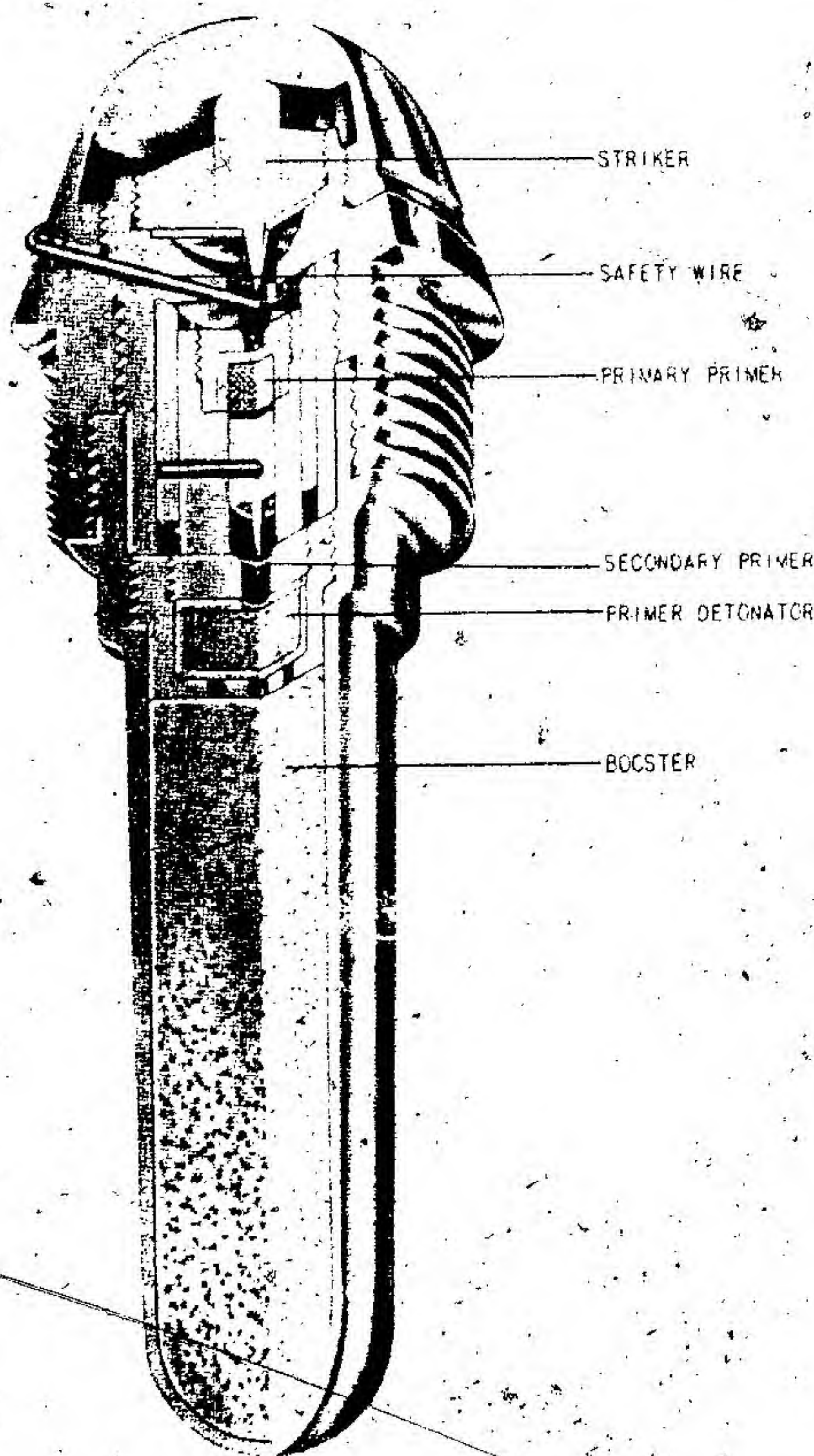


Figure 439—Type 5th-Year Nose Fuze.

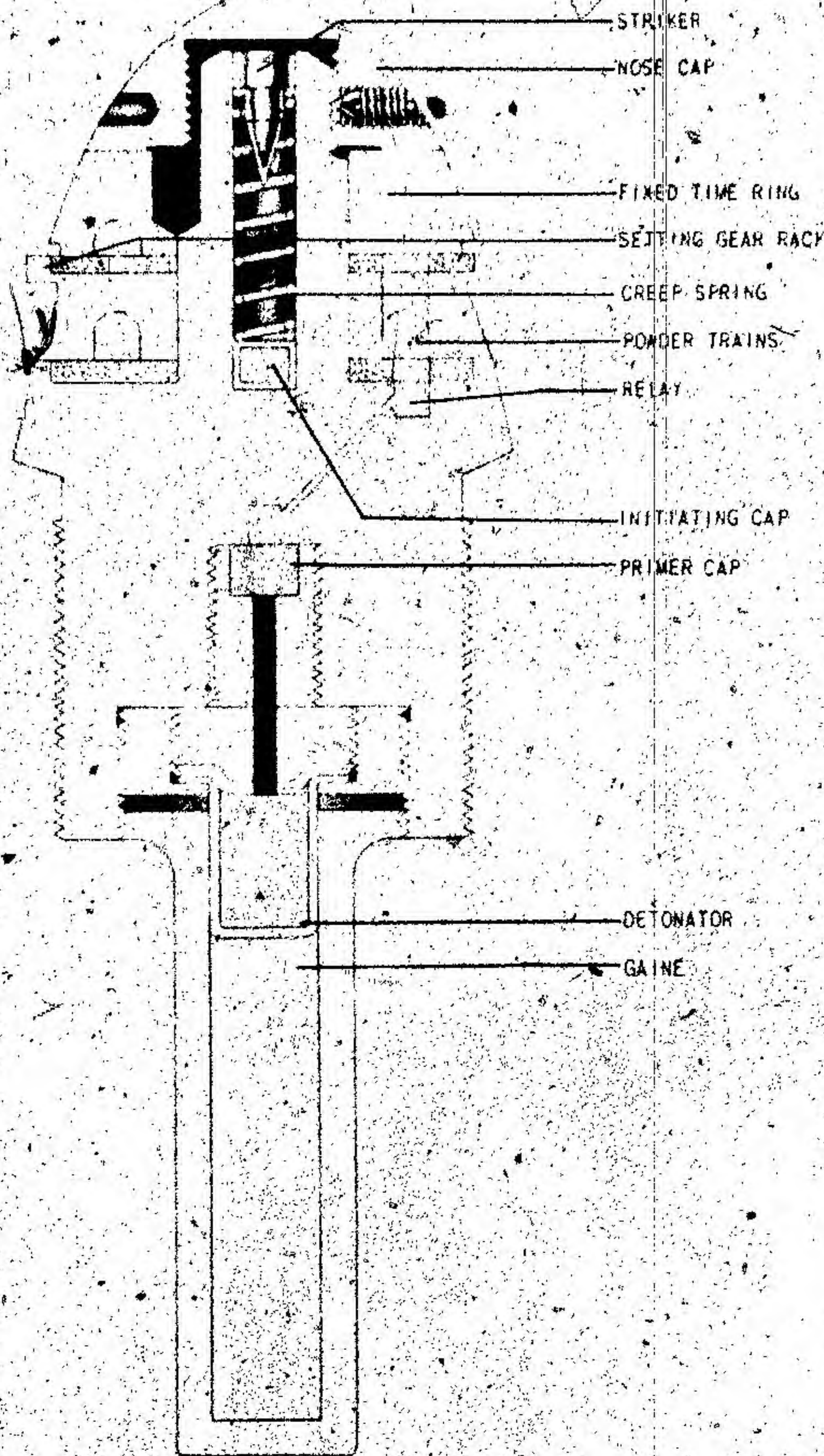


Figure 440—40-mm Powder Time Fuze.

Construction: The fuze body, gaine, magazine carrier, and nose cap are made of aluminum. The two time rings are made of brass. A hollow spindle protrudes up from the fuze body, over which are fitted the lower (movable) and upper (fixed) time rings. The nose cap threads onto this extension and holds the upper time ring in place. Housed within the hollow spindle are the striker, creep spring, and initiating cap or primer. Halfway up the side of the hollow spindle is a flash port leading to the upper time train. There is a tooth rack machined around the upper edge of the lower time ring for automatic setting.

The gaine threads into the lower end of the fuze body.

Operation: As the round feeds into the gun, a rack engages the teeth of the lower time ring, which is rotated about its axis by the meshing of these gears, setting the fuze. When the gun is fired, the force of set-back causes the striker to pierce the primer. The flash from the primer passes to the upper time ring, and in turn, to the lower. The flash from the lower time ring sets off the relay pellet and the black powder, which flashes down to the gaine.

Type 3 Aerial-Burst-Impact Mortar Fuze

Use: 8-cm mortar ammunition.
 Over-all length (with gaine): 3 1/4 inches.
 Over-all length (without gaine): 2 1/4 inches.
 Maximum diameter: 1 1/4 inches.
 Threaded length: 1/2 inch.
 Number of threads: 7 R. H.

Construction: This fuze is made of a three-piece black steel or brass body. Protruding from the nosepiece is the primary, or impact, striker which houses the secondary or aerial-burst striker. A metal safety clip fits around and holds the striker

from the primary primer. The secondary striker within the shaft of the primary striker is held from the aerial-burst primer by a small coiled spring. Housed in the lower end of the primary striker is an aerial-burst primer and a short delay

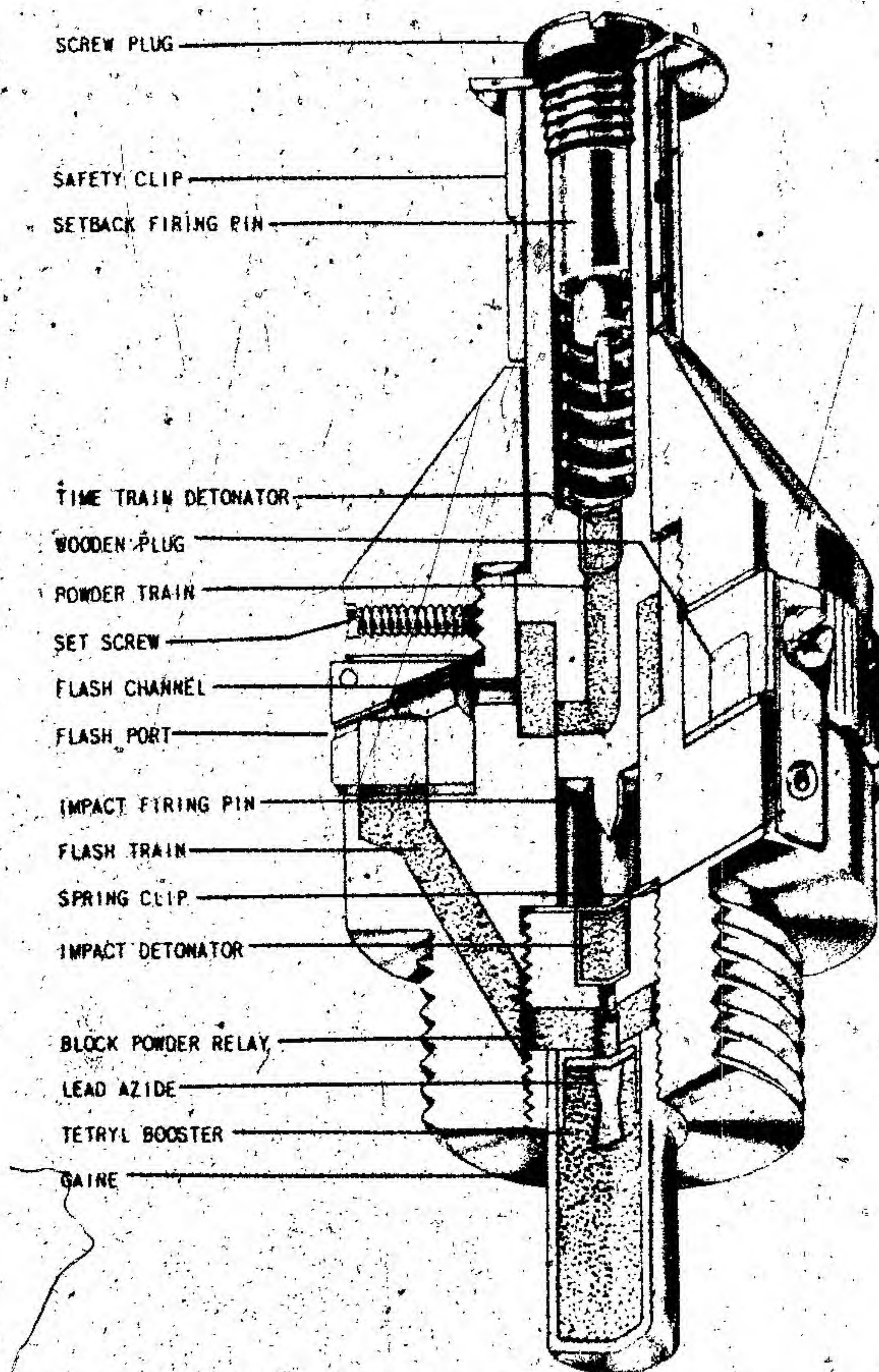


Figure 441—Type 3 Aerial-Burst-Impact Mortar Fuze.

train leading to a black-powder collar which fits around the lower circumference of the primary striker. The explosive train from this collar leads through ports in the midsection of the fuze to the powder time train housed in the midsection. The midsection is movable and may be set for impact firing or aerial burst (2 to 22 seconds).

In the lower fuze section there is one explosive-filled channel, the upper end of which contacts the powder time ring, and the lower end leads to the explosive gaine.

Operation: For aerial-burst firing, the time ring is set and the safety clip removed. On set-back, the secondary striker initiates the aerial-burst primer, which in turn burns through the powder time train to the explosive gaine. If impact occurs prior to the lapse of the time set, the primary striker will be driven onto the primary primer. The delay-arming (black) powder collar around the primary striker is designed to allow firing the mortar from a concealed position through underbrush and gives a definite bore safety.

30-Second Powder Time Fuze

Use: 12-cm-illuminating projectile.

Over-all length: 2¼ inches.

Maximum diameter: 2½ inches.

Threaded length: ½ inch.

Number of threads: 3 R.H.

Construction: The fuze is built with a brass

nose piece, an aluminum midsection, a fixed and movable powder ring, and a brass base section which houses a black-powder magazine in the rear end and supports a central spindle which houses the fixed firing pin. The spindle and base section are made in one piece. The nose piece is a hollow truncated cone containing four vent holes forward and threaded (R. H.) internally; rear, to

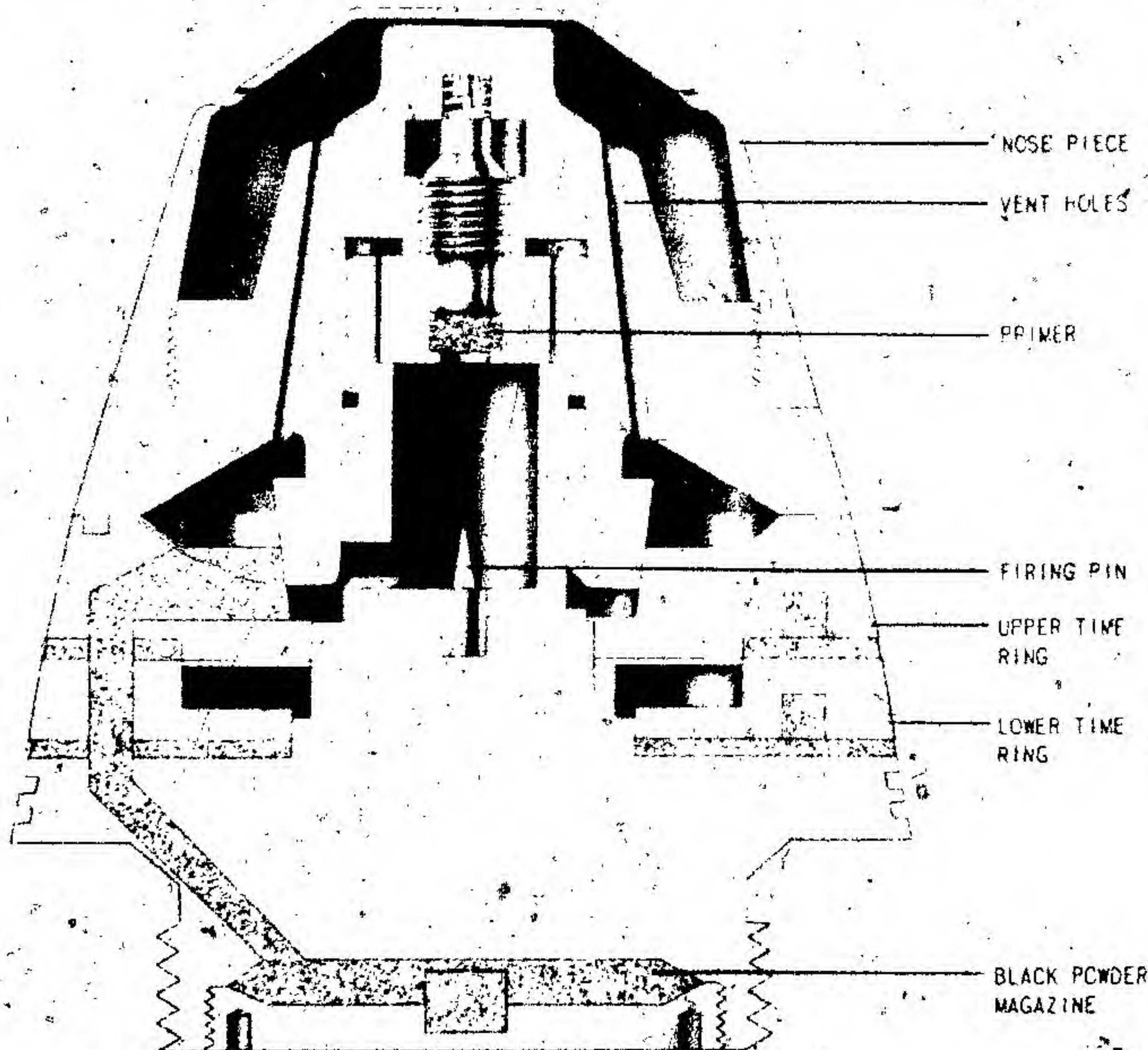


Figure 442—30-Second Powder Time Fuze.

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fit the forward end of the aluminum midsection. The aluminum midsection has four vents forward and a threaded (R. H.) opening located centrally. At the rear of the threaded opening, the aluminum piece has a longitudinal recess to take a small coiled spring whose purpose is to prevent the freezing of the movable primer carrier, which is partially housed in the aluminum midsection. A narrow lip around the base circumference of the midsection fits into a groove on the upper surface of the fixed (upper) time ring and forms a seal. The rear end of the movable primer carrier is housed in the forward end of the spindle. The primer carrier is made of a small brass cylinder, into the top of which is threaded a small weight.

The primer is carried in the lower part of the carrier and rests on an internal lip. Surrounding the cylinder and secured by a tight friction fit, is a split brass collar which rests upon an internal shoulder in the upper end of the spindle. The movable (lower) time ring has the time settings (0 to 30 seconds) in increments of $\frac{1}{4}$ second. A segmented brass friction washer is keyed to the spindle and holds the fixed time ring in position.

Operation: Upon firing, set-back causes the primer carrier to move down out of the split collar and onto the firing pin. The flash ignites the black-powder delay in the upper time ring, and after the set delay period the black powder magazine is ignited.

Type 91 Mechanical Time Fuze

Use:

- 12-cm ordinary projectiles (semifixed).
- 12-cm ordinary projectiles (fixed).
- 12-cm incendiary-shrapnel projectiles (fixed).
- 12.7-cm ordinary projectiles (fixed).
- 12.7-cm incendiary-shrapnel (fixed).
- 14-cm illuminating projectiles (bag).
- 15-cm illuminating projectiles (bag).
- 15.5-cm illuminating projectiles (bag).

Over-all length: $2\frac{1}{8}$ inches.

Maximum diameter: $2\frac{1}{2}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: 6.

Construction: Type 91, the fuze body consists of an aluminum nose cap, and a nickel-plated brass time-setting ring, locking ring, and base section. Housed in the nose cap is a spring-supported set-back hammer. Immediately below the set-back hammer is a spring-driven clock mechanism identical in construction to those in Japanese bomb fuzes D-2 (a), D-2 (b) and D-2 (c). However, this fuze is started by set-back and maintained in the armed position by centrifugal force. The time-setting ring has a vertical opening on its top rim by which the clock may be wound with an appropriate tool after the nose cap has been removed. There are two exterior setting lugs. One is secured to the time ring and the other to the lower portion of the fuze body. The time-setting ring is graduated in one-second intervals from 0 to 55 seconds.

Operation: Before firing the gun, the setting disk is connected to the time setting ring of the fuze by the control arm. It is not connected to the clockwork, but is free to rotate around the clockwork spindle when the time-setting ring of the fuze is moved in the setting. Setting of the fuze varies the distance the setting disk must be rotated by the clockwork before the striker release arm will fall into the slot in the setting disk and release the striker.

Until the gun is fired, the clockwork is held immobile by the escapement release arm connected to a vertical shaft. A torsion spring working on the shaft tends to rotate the escapement release arm away from the clockwork gears. It is prevented from doing this by a projection on the upper end of the vertical shaft which bears against a shoulder of the clock-starting plunger.

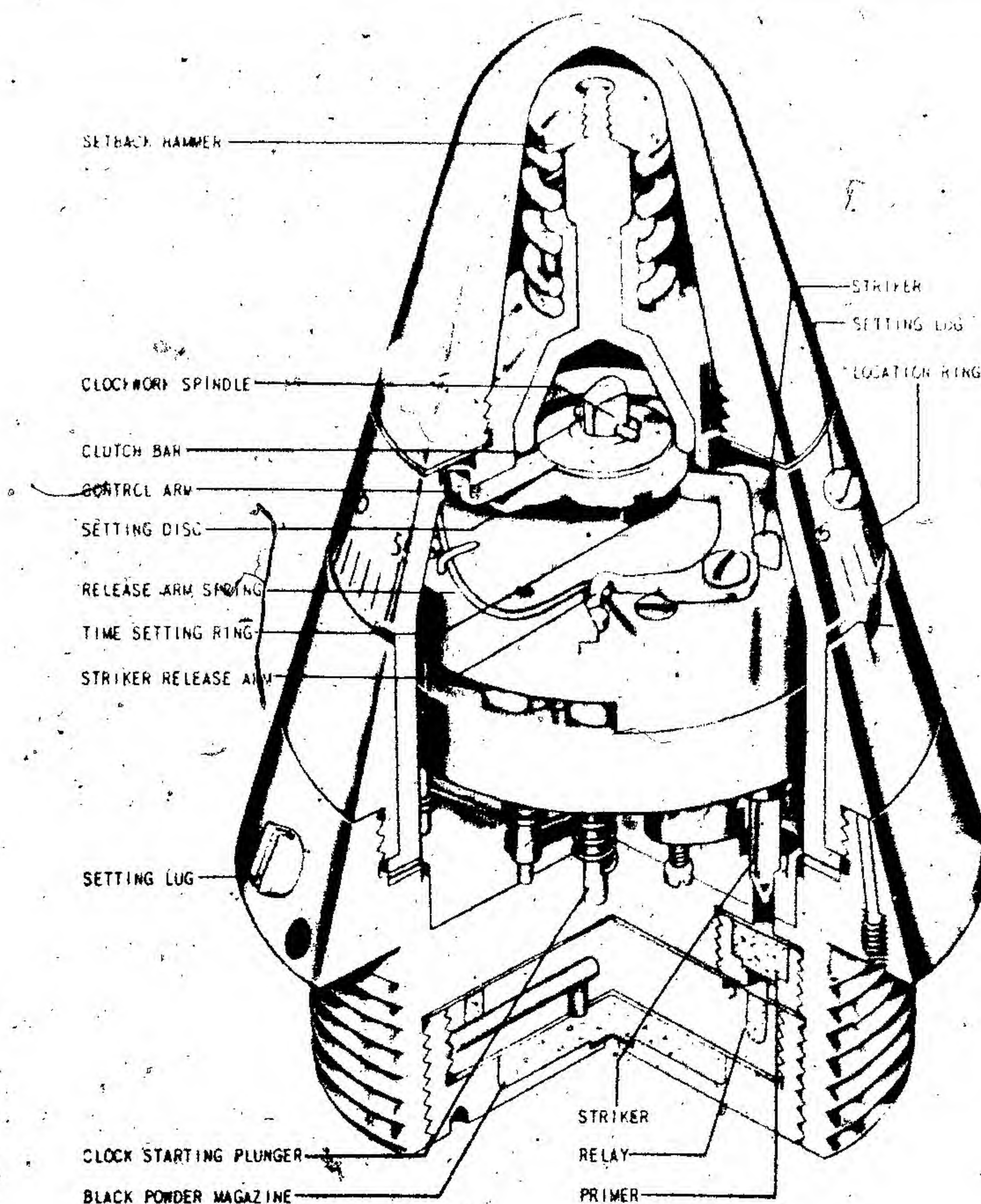


Figure 443—Type 91 Mechanical Time Fuze.

When the gun is fired, the set-back hammer is left behind with sufficient force to:

1. Bend the control arm out of engagement with the time setting ring.
2. Drive the clutch bar down into a slot in the upper end of the clock—thus spreading it sufficiently to clutch the setting disk to the clockwork spindle. At the same time, the clock-starting plunger is left behind by setback and thereby removes the shoulder from in front of the extension of the escapement release-arm shaft, allowing the escapement release arm to be rotated free of

the clockwork gears. The clockwork is now free to run and starts to rotate the setting disk in a counterclockwise direction. With centrifugal force, a centrifugal safety lock is thrown out from below a shoulder of the striker, which is now free to be released.

When the clock-starting plunger moves downward, its upper end is removed from the outer end of the striker release arm, which is now free to move outward under the impulse of the striker release-arm spring, and its inner end then bears against the setting disk. When the setting disk

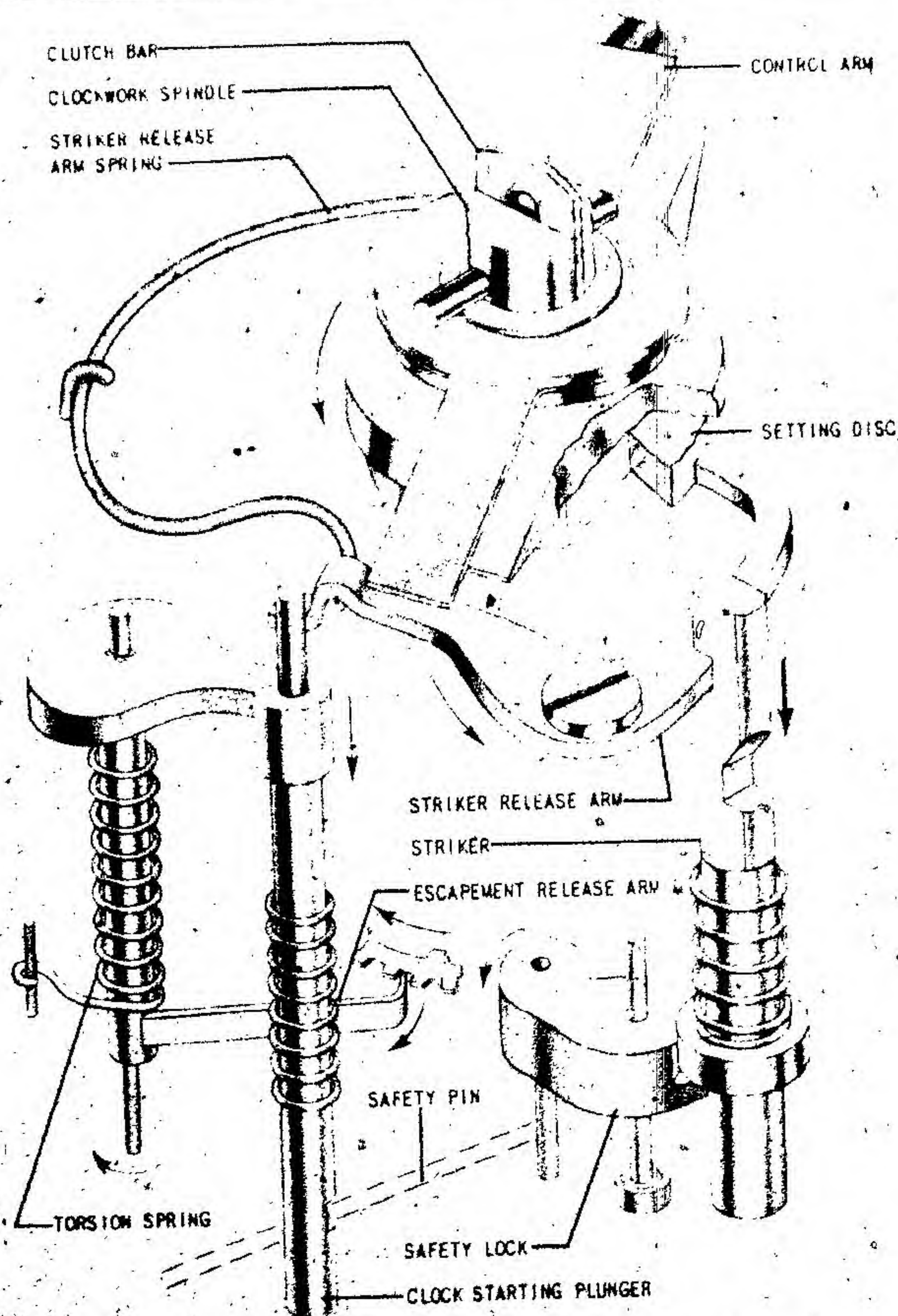


Figure 444—Type 91 Mechanical Time Fuze.

is rotated sufficiently to bring the notch into alignment with the inner end of the striker release arm, the striker release arm spring forces the outer end of the release arm out, thereby pivoting the inner end into the slot of the setting disk. When this happens, the striker release arm moves out of its notch in the striker, which is then driven downward onto the primer cap, initiating

the detonation of the projectile via the medium of the auxiliary fuze.

Remarks: There is a modified version of this fuze that has a gear ring for automatic setting. This is used in the 12.7-cm ammunition for the 12.7-cm A. A. gun which has an automatic time-setting device.

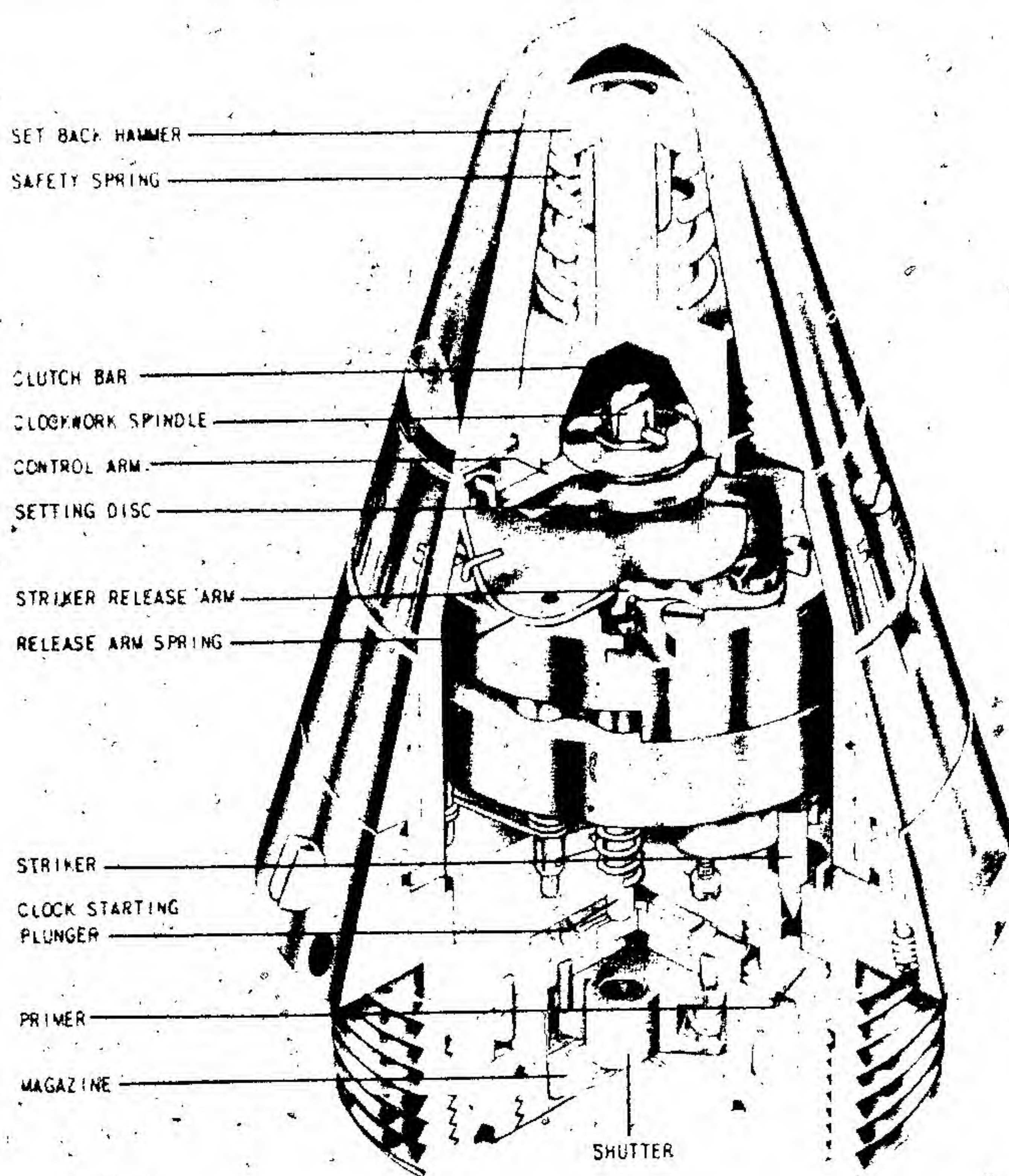


Figure 445—Type 0 Mechanical Time Fuze.

Type 0 Mechanical Time Fuze

Use: Ordinary projectiles for the 12-cm and 20-cm short guns.

Over-all length: $2\frac{1}{8}$ inches.

Maximum diameter: $2\frac{1}{2}$ inches.

Threaded length: $\frac{1}{2}$ inch.

Number of threads: 6.

Construction: This fuze is the same as the type 91 Mod 1, except that it has a weaker set-back spring and has a flash shutter in the basal portion. It is distinguished from the type 91 Mod 1 by a red nosepiece.

Operation: The operation is the same as the type 91 Mod 1, with the addition of the centrifugal flash shutter in the base, which swings back under centrifugal force, thus opening up the firing train.

Type 98 Mechanical Time Fuze

Use: 10-cm ordinary (fixed).
 Over-all length: $4\frac{1}{16}$ inches.
 Maximum diameter: $2\frac{1}{16}$ inches.
 Threaded length: $\frac{1}{2}$ inch.

Construction: This fuze is similar to the type 91 Mod 1, but is longer in order to conform to the ogive of the projectiles it is used in. It incorporates the automatic gear setting ring and flash shutter in the basal portion that is found in the

type 0 fuze. It is graduated from 0-45 seconds in increments of 1 second.

Operation: The operation is identical to the type 0 fuze.

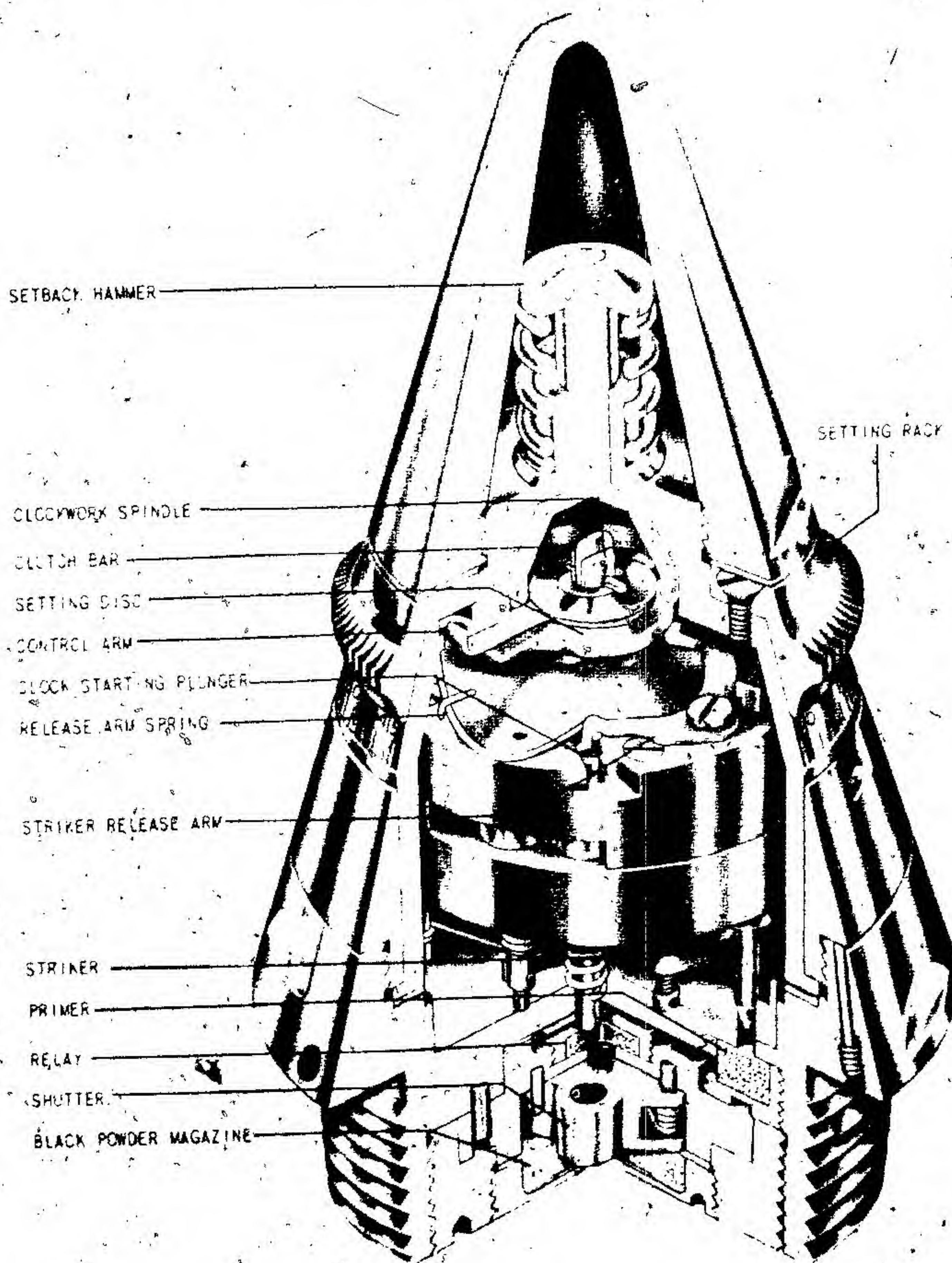


Figure 446—Type 98 Mechanical Time Fuze.

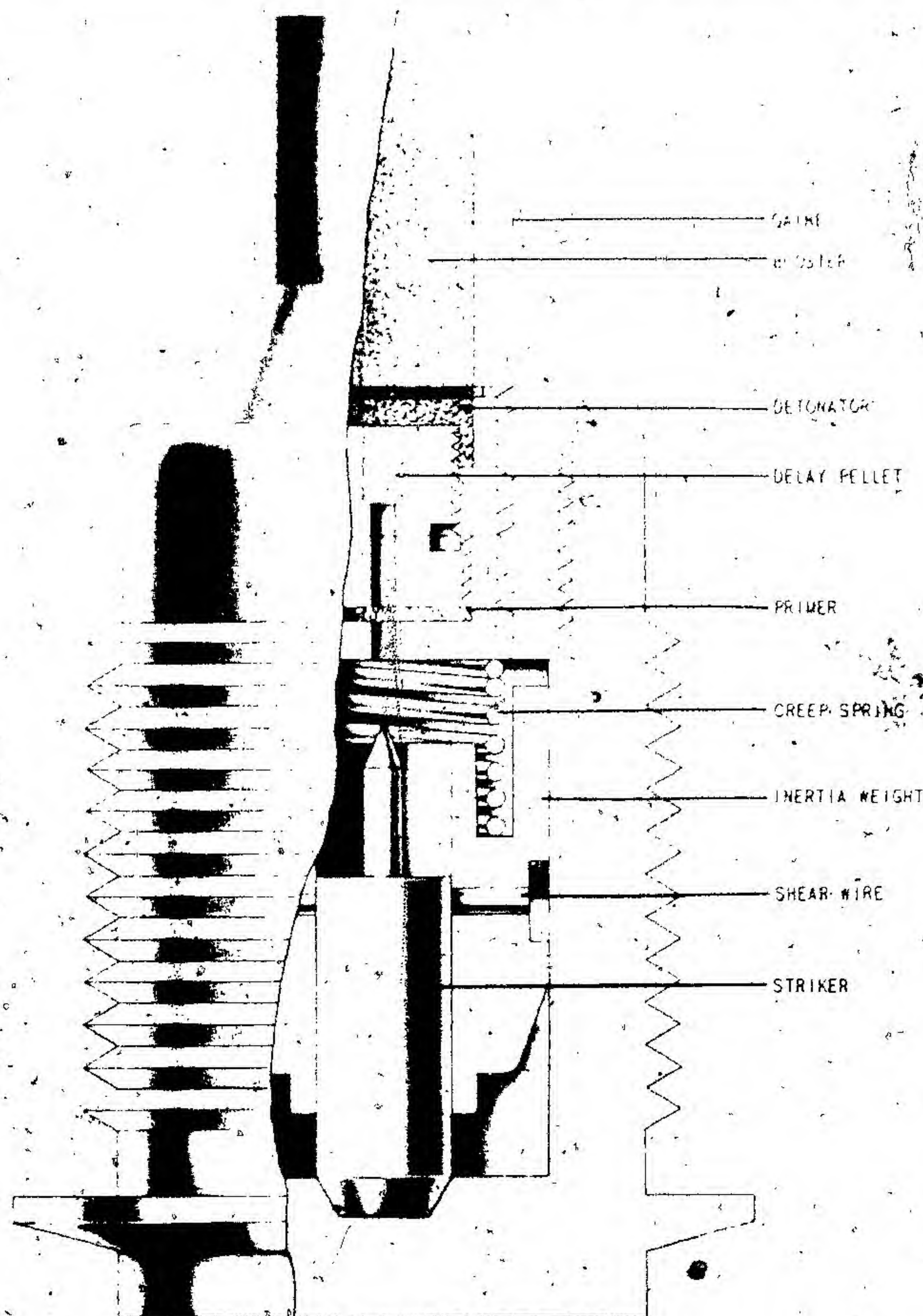


Figure 447—40-mm Base Fuze.

40-mm Base Fuze

Use: 40-mm A. P.-H. E. projectiles.
 Over-all length (with gaine): $2\frac{1}{2}$ inches.
 Over-all length (without gaine): $1\frac{1}{2}$ inches.
 Maximum diameter: $1\frac{1}{2}$ inches.
 Threaded length: $\frac{3}{8}$ inch L. H.

Construction: A cylindrical steel piece is threaded externally and centrally drilled to provide a recess to house and guide the striker, inertia weight, and creep spring. It is threaded internally on the forward end to take the gaine. The

striker is housed in and secured to the inertia weight by a copper shear pin. The inertia weight is a steel cylinder which closely fits the inner opening of the fuze body and is held in the rear-most position by a creep spring resting between the explosive-train carrier and an annular groove in the forward end of the inertia weight.

Operation: On firing, set-back causes the inertia weight to move downward, breaking the shear wire and exposing the striker. Upon impact, the striker and collar move against the creep spring and the firing pin pierces the primer.

5-cm Base Fuze

Use: 5-cm. H. E. projectiles.

Over-all length: $1\frac{1}{8}$ inches.

Diameter of threaded portion: $\frac{1}{2}$ inch.

Construction: The fuze consists of a steel cylinder externally threaded and drilled internally to take a soft metal block in which the striker is friction-fitted. The striker is a steel pin. The end of the fuze is closed by the primer holder.

against the base of the fuze and cannot pierce the primer, since the striker block has a concave surface on the forward end. On set-back, the striker block moves back and leaves the striker protruding. On impact, both the striker and striker block move forward with the striker, hitting the primer.

Operation: Before firing, the striker rests

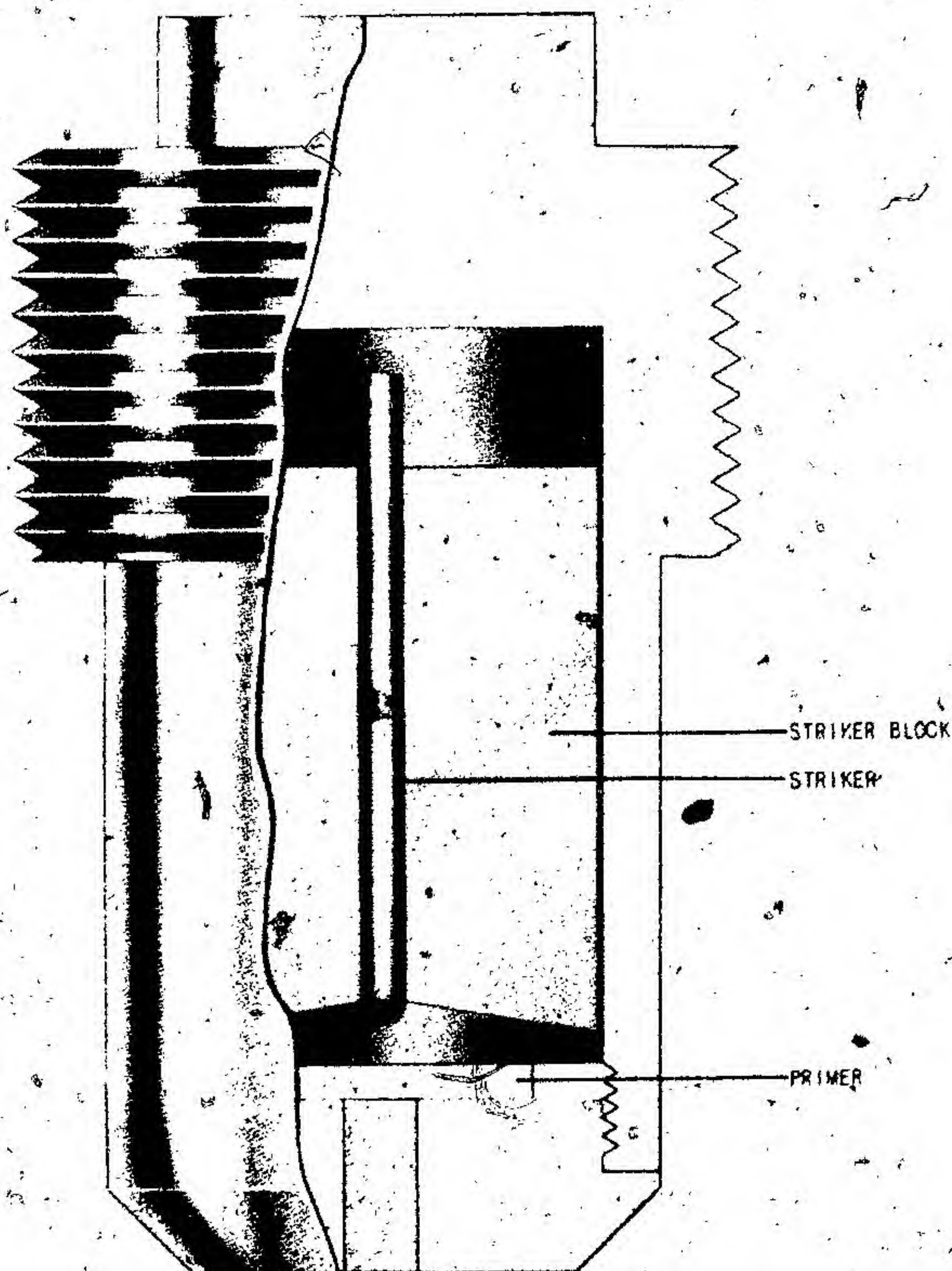


Figure 448—5-cm Base Fuze.

Type 3d-Year Mk 1 Base Impact Fuze

Use: 12-cm. ordinary projectiles (semifixed).

Over-all length (with gaine): $5\frac{1}{8}$ inches.

Over-all length (without gaine): $3\frac{1}{4}$ inches.

Maximum diameter: $1\frac{1}{8}$ inches.

Threaded length: $1\frac{1}{8}$ inches.

Number of threads: 12.

Construction: Excepting the set-back plunger and gaine, this fuze is constructed entirely of brass and made of two pieces. The base of the rear portion contains an oblong slot into which the rear end of the threaded spindle and/or striker is fitted. On the threads of the striker rides an inertia weight which is free to revolve about the striker except for a set-back plunger which, in the unarmed position, rests partially in a recess in the inertia weight and partially in a stationary collar in the fuze body, thus preventing any revolution of the inertia weight. This inertia weight prevents the striker from falling onto the primer of the gaine. The forward end of the striker fits down through an inner collar, which is a part of the forward section of the fuze. Immediately before the threaded portion of the striker is a split collar which is wedged between the threads and the inner collar, affording an additional safety feature.

Operation: On set-back, the flanged inertia plunger moves back into the recess of the inertia weight. Since the striker is keyed to the fuze and thus spins with the fuze, the inertia weight lags behind and moves back to the base of the fuze. The force of impact causes the striker to move forward, overcoming the split brass collar, onto the primer.

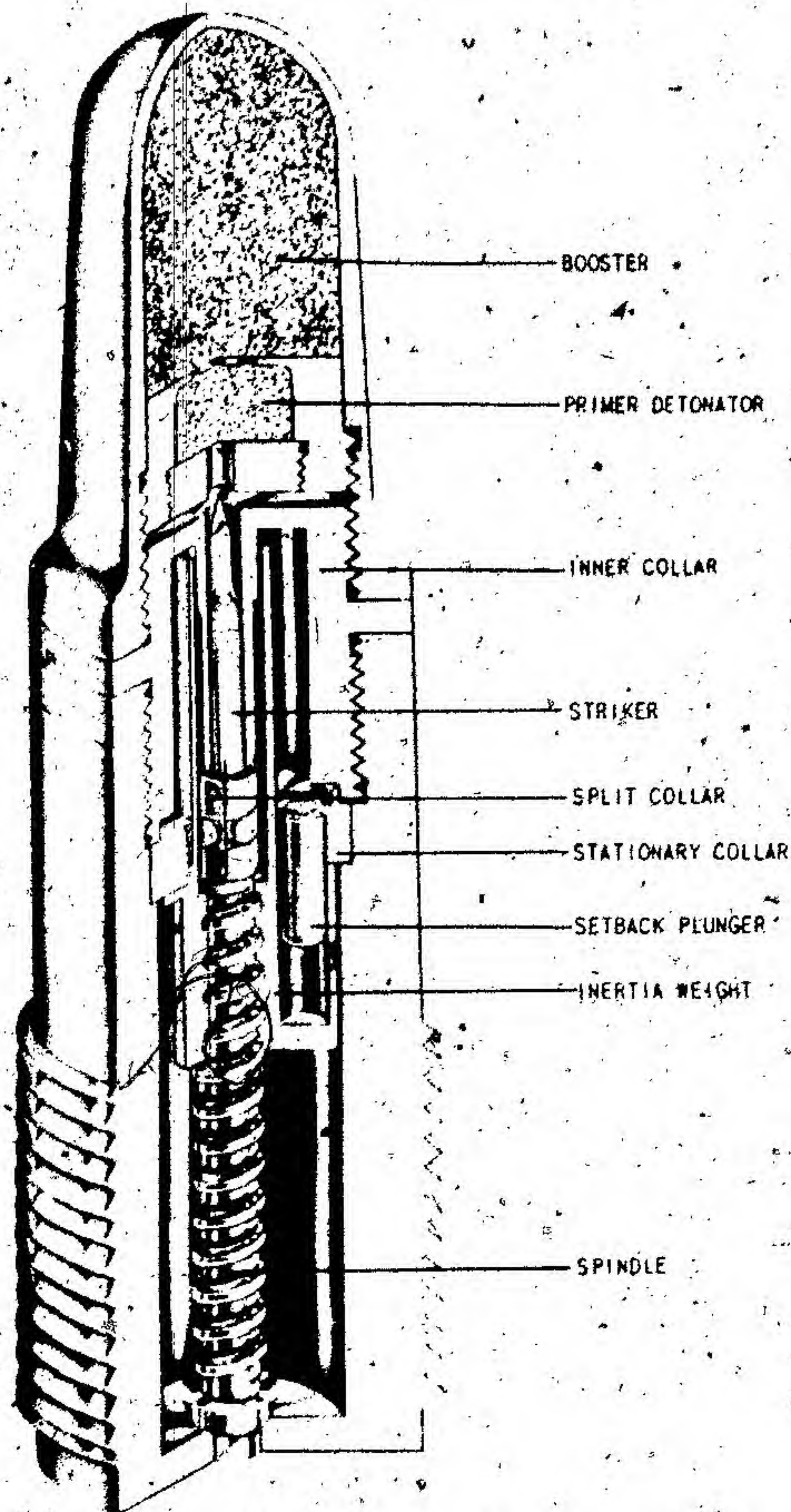


Figure 449—Type 3rd-year Mk 1 Base Impact Fuze.

Type 13th-Year Mk 1 Mod 1 Base Impact Fuze

Use: 14 and 15 cm. common projectiles.

Over-all length (without fuze carrier): $5\frac{1}{8}$ inches.

Length of fuze body (without Gaine): $3\frac{1}{8}$ inches.

Maximum diameter (with fuze): $1\frac{1}{8}$ inches.

Threaded length: $1\frac{1}{8}$ inches.

Number of threads: 13.

Construction: This fuze is threaded externally on the forward end to fit the large explosive gaine and externally on the after end to fit into the base-fuze carrier. Both the gaine and the base-fuze carrier are secured to the fuze by a grub screw. The fuze is bored to two diameters longitudinally. The after and larger diameter accommodates the arming mechanism and the head of the striker; the forward diameter forms a friction fit with the main body of the striker. The arming mechanism is housed in a metal block (fuze base) which threads into the after end of the fuze and is secured by a lock bolt. On the forward end of this block is an arming cam carrier supporting five interlocking arming cams, pivoted separately, which, in the unarmed position, rest in a circumferential groove in the striker and hold the striker from the primer. A set-back plunger rests in a recess in the fuze base and is supported by the fingers of a metal sleeve. The forward end of the set-back plunger protrudes through the arming-cam carrier to prevent the movement of the master arming cam with which the remaining arming cams interlock. A safety pin holds the set-back plunger in the forward position before the fuze is installed into the projectile.

The gaine contains the primer, delay train, and booster. A thin cardboard disk is placed over the primer to prevent the striker from prematurely piercing the primer as a result of creep.

Operation: On set-back the set-back plunger moves back and is held by the fingers of a metal sleeve. The arming cams move out with centrifugal force, freeing the striker to move down onto the primer on impact.

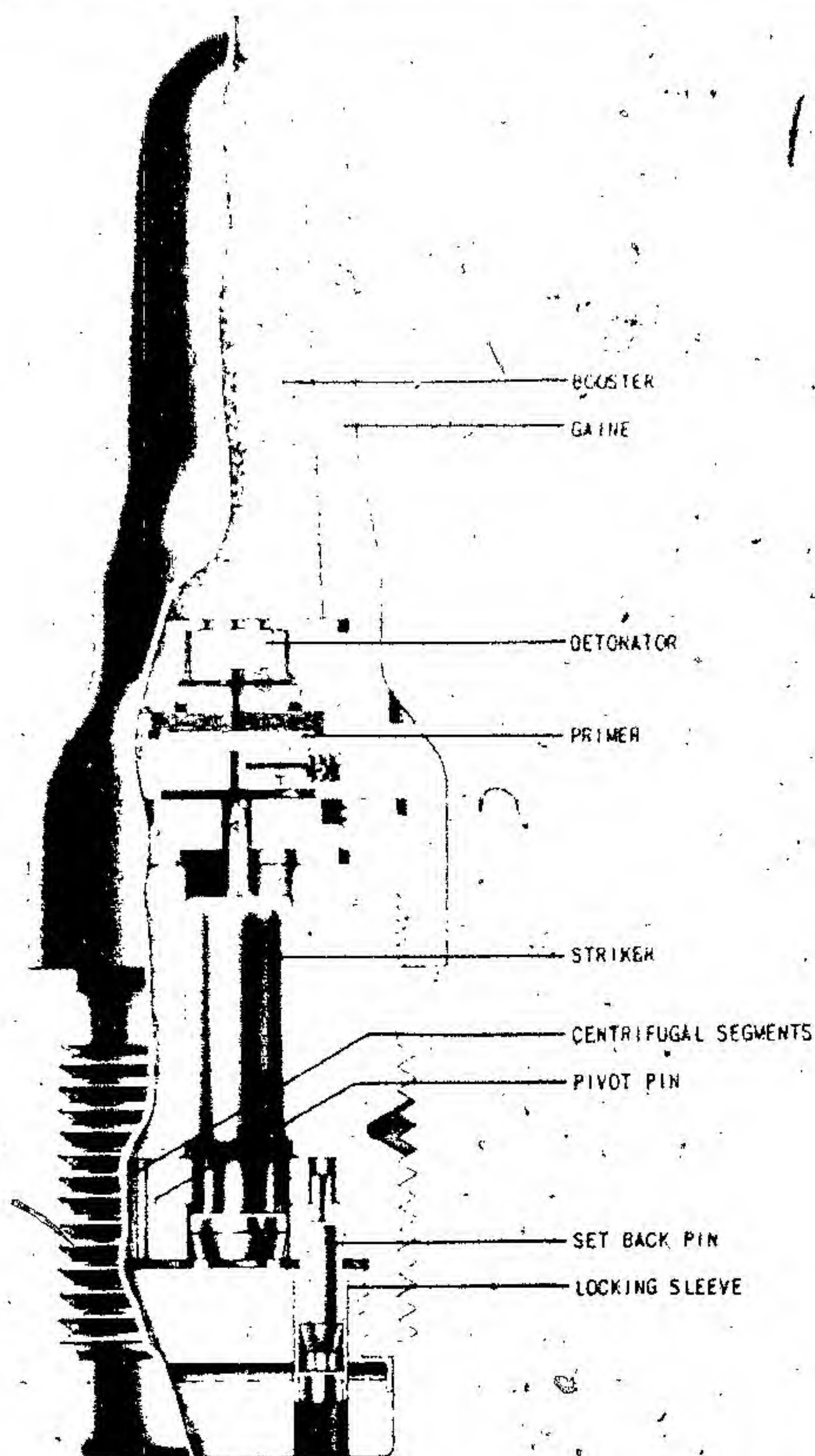
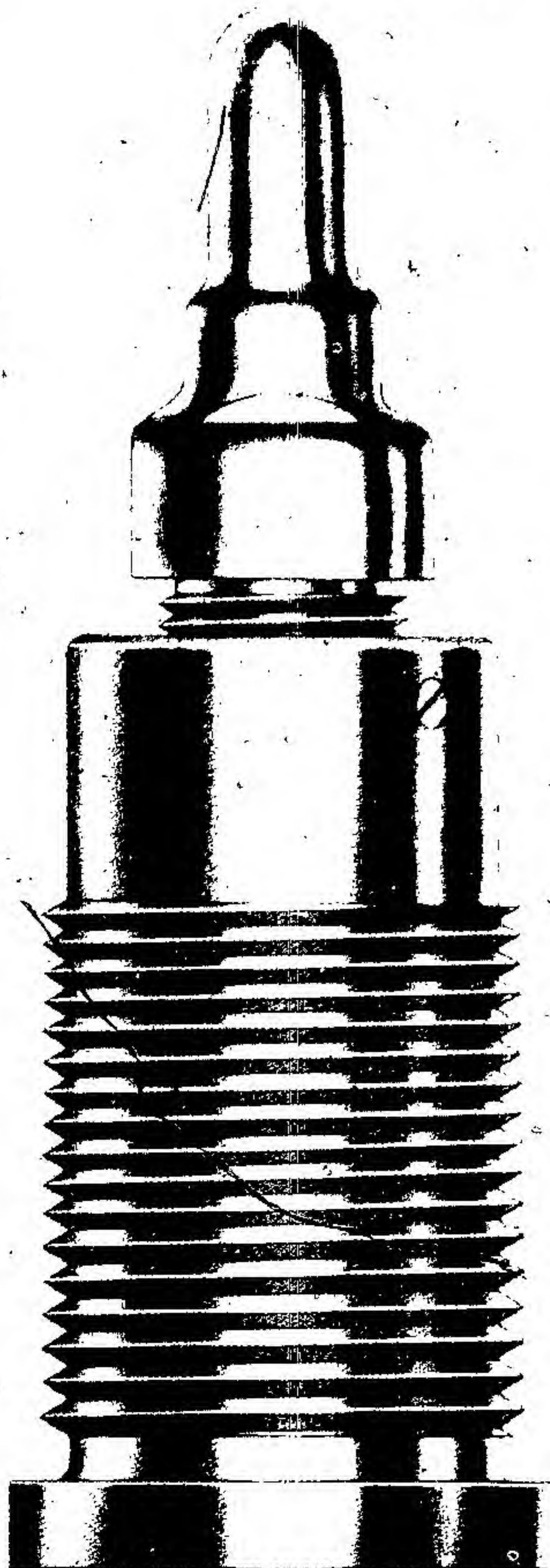


Figure 450—Type 13th-year Mk 1 Mod 1 Base Fuze.



TYPE 13 YEAR MK 4



TYPE 13 YEAR MK 4 MOD 1

Figure 451—Type 13-Year Mk 4 and Mk 4 Mod 1 Base Fuzes.

Type 13th-Year Mk 4 and Mk 4 Mod 1 Base Fuzes

Use:

Type 13th-year Mk 4 20-cm type 91 A. P.
Type 13th-year Mk 4 Mod 1 36-cm. A. P.

	Mk 4	Mk 4 Mod 1
Over-all length (with gaine).	6 $\frac{1}{2}$ inches.	6 $\frac{1}{2}$ inches.
Threaded length.....	1 $\frac{1}{4}$ inches.	1 $\frac{1}{4}$ inches.
Number of threads...	13.....	13.

Construction: The design of these fuzes is almost identical to the type 13-year Mk 1 Mod 1 fuze, differing only in size and minor body features. The gaine, however, is of different construction than that used in the Mk 1 fuze. It contains a primer delay, relay, initiator, and booster.

Operation: The operation of this fuze is the same as the type 13-year Mk 1 Mod 1.

REFERENCE TABLE 1

INCHES TO MILLIMETERS

Basis: 1 inch = 25.4 Millimeters

Inches	Millimeter	Inches	Millimeter	Inches	Millimeter	Inches	Millimeter
1	25.4	26	660.4	51	1,295.4	76	1,930.4
2	50.8	27	685.8	52	1,320.8	77	1,955.8
3	76.2	28	711.2	53	1,346.2	78	1,981.2
4	101.6	29	736.6	54	1,371.6	79	2,006.6
5	127.0	30	762.0	55	1,397.0	80	2,032.0
6	152.4	31	787.4	56	1,422.4	81	2,057.4
7	177.8	32	812.8	57	1,447.8	82	2,082.8
8	203.2	33	838.2	58	1,473.2	83	2,108.2
9	228.6	34	863.6	59	1,498.6	84	2,133.6
10	254.0	35	889.0	60	1,524.0	85	2,159.0
11	279.4	36	914.4	61	1,549.4	86	2,184.4
12	304.8	37	939.8	62	1,574.8	87	2,209.8
13	330.2	38	965.2	63	1,600.2	88	2,235.2
14	355.6	39	990.6	64	1,625.6	89	2,260.6
15	381.0	40	1,016.0	65	1,651.0	90	2,286.0
16	406.4	41	1,041.4	66	1,676.4	91	2,311.4
17	431.8	42	1,066.8	67	1,701.8	92	2,336.8
18	457.2	43	1,092.2	68	1,727.2	93	2,362.2
19	482.6	44	1,117.6	69	1,752.6	94	2,387.6
20	508.0	45	1,143.0	70	1,778.0	95	2,413.0
21	533.4	46	1,168.4	71	1,803.4	96	2,438.4
22	558.8	47	1,193.8	72	1,828.8	97	2,463.8
23	584.2	48	1,219.2	73	1,854.2	98	2,489.2
24	609.6	49	1,244.6	74	1,879.6	99	2,514.6
25	635.0	50	1,270.0	75	1,905.0	100	2,540.0

REFERENCE TABLE 2

MILLIMETERS TO INCHES

Basis: 1 inch = 25.4 Millimeters

Millimeter	Inch .	Millimeter	Inches	Millimeter	Inches	Millimeter	Inches
1----	0. 03937	26----	1. 023622	51----	2. 007874	76----	2. 992126
2----	. 078740	27----	1. 062992	52----	2. 047244	77----	3. 031496
3----	. 118110	28----	1. 102362	53----	2. 086614	78----	3. 070866
4----	. 157480	29----	1. 141732	54----	2. 125984	79----	3. 110236
5----	. 196850	30----	1. 181102	55----	2. 165354	80----	3. 149606
6----	. 236220	31----	1. 220472	56----	2. 204724	81----	3. 188976
7----	. 275591	32----	1. 259843	57----	2. 244094	82----	3. 228346
8----	. 314961	33----	1. 299213	58----	2. 283465	83----	3. 267717
9----	. 354331	34----	1. 338583	59----	2. 322835	84----	3. 307087
10----	. 393701	35----	1. 377953	60----	2. 362205	85----	3. 346457
11----	. 433071	36----	1. 417323	61----	2. 401575	86----	3. 385827
12----	. 472441	37----	1. 456693	62----	2. 440945	87----	3. 425197
13----	. 511811	38----	1. 496063	63----	2. 480315	88----	3. 464567
14----	. 551181	39----	1. 535433	64----	2. 519685	89----	3. 503937
15----	. 590551	40----	1. 574803	65----	2. 559055	90----	3. 543307
16----	. 629921	41----	1. 614173	66----	2. 598425	91----	3. 582677
17----	. 669291	42----	1. 653543	67----	2. 637795	92----	3. 622047
18----	. 708661	43----	1. 692913	68----	2. 677165	93----	3. 661417
19----	. 748031	44----	1. 732283	69----	2. 716535	94----	3. 700787
20----	. 787402	45----	1. 771654	70----	2. 755906	95----	3. 740157
21----	. 826772	46----	1. 811024	71----	2. 795276	96----	3. 779528
22----	. 866142	47----	1. 850394	72----	2. 834646	97----	3. 818898
23----	. 905512	48----	1. 889764	73----	2. 874016	98----	3. 858268
24----	. 944882	49----	1. 929134	74----	2. 913386	99----	3. 897638
25----	. 984252	50----	1. 968504	75----	2. 952756	100----	3. 937008

REFERENCE TABLE 3

BINARY FRACTIONS OF AN INCH TO DECIMAL INCHES AND MILLIMETERS

Fractions	Decimal	Millimeters
$\frac{1}{16}$	0.0625	1.5875
$\frac{1}{8}$	0.125	3.175
$\frac{3}{16}$	0.1875	4.7625
$\frac{1}{4}$	0.25	6.35
$\frac{5}{16}$	0.3125	7.9375
$\frac{3}{8}$	0.375	9.525
$\frac{7}{16}$	0.4375	11.1125
$\frac{1}{2}$	0.5	12.7
$\frac{9}{16}$	0.5625	14.2875
$\frac{5}{8}$	0.625	15.875
$\frac{11}{16}$	0.6875	17.4625
$\frac{3}{4}$	0.75	19.05
$\frac{13}{16}$	0.8125	20.6375
$\frac{7}{8}$	0.875	22.225
$\frac{15}{16}$	0.9375	23.8125
1	1.0	25.4

REFERENCE TABLE 3—Continued

BINARY FRACTIONS OF AN INCH TO DECIMAL INCHES AND MILLIMETERS

Fractions	Decimal	Millim.
$\frac{1}{16}$	.062500	1.587500
$\frac{1}{8}$	.125000	3.175000
$\frac{3}{16}$	.187500	4.762500
$\frac{1}{4}$	.250000	6.350000
$\frac{5}{16}$	.312500	7.937500
$\frac{3}{8}$	.375000	9.525000
$\frac{7}{16}$	.437500	11.112500
$\frac{1}{2}$	.500000	12.700000
$\frac{9}{16}$	.562500	14.287500
$\frac{5}{8}$	.625000	15.875000
$\frac{11}{16}$	.687500	17.462500
$\frac{3}{4}$	.750000	19.050000
$\frac{13}{16}$	.812500	20.637500
$\frac{7}{8}$	.875000	22.225000
$\frac{15}{16}$	.937500	23.812500
1	1.000000	25.400000